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AV Communication Review

AUDIO VISUAL

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Teaching Ninth-Grade Biology by Television

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PUBLICATIONS ANNOUNCEMENT

Subscribers to this journal received the first Supplement to Volume 8 two months ago when TEACHING MACHINES: AN ANNOTATED BIBLIOGRAPHY *by Fry, et al. was published. This timely issue of* AV COMMUNICATION REVIEW *has met with wide approval from readers in all parts of the world, and we are more convinced than ever of the need for efficient dissemination of this kind of information.*

The rapidly developing body of theory and research on teaching machines, their programming and application, has dictated a change in plans for the book, TEACHING MACHINES AND PROGRAMMED LEARNING, *previously announced for publication in May. In addition to the originally announced content of this volume, several hundred pages of research abstracts as well as a comprehensive bibliography and index have been added by the editors, A. A. Lumsdaine and Robert Glaser.*

Although these major additions have made necessary a delay in the publication of this work (and an embarrassing increase in price), we feel that you will agree with the decision of our editors when you see this comprehensive work—now scheduled for release early this fall: TEACHING MACHINES AND PROGRAMMED LEARNING: A SOURCE BOOK, *edited by A. A. Lumsdaine and Robert Glaser, 736 p., $7.50.*

Orders received before July 15 will be filled at the previously announced price of $4.50, based on a 400-page volume.

DIRECTOR OF PUBLICATIONS, DAVI

CONTENTS

ARTICLES

Programming Verbal Skills for Primary Grades *Helen M. Popp and Douglas Porter* 165

Teaching Ninth-Grade Biology by Television *James N. Jacobs and Joan K. Bollenbacher* 176

ETV Research in the Decade Ahead *E. G. Sherburne, Jr.* 192

Self Instruction in Audiovisual Education: A Title VII Progress Report *T. M. Reeves and G. M. Torkelson* 202

REPORTS IN BRIEF

The Earlham College Self-Instructional Program *John A. Barlow* 207

On Reactions to Mass Media Content *Richard F. Carter* 210

Filmed Lectures as Supplementary and Refresher Education *Frank R. Hartman* 214

Teaching High School Physics Through the Use of Films *Donald T. Scott* 220

TITLE VII

New Grants Announced 222

CURRENT DEVELOPMENTS

International Cooperation in Mass Communication Research *Raymond B. Nixon* 224

WORLD COMMUNICATIONS

A Proposal for International Audiovisual Exchange *Edgar Dale* 229

BOOK REVIEWS

A New Communication on Communication *James Q. Knowlton* 234

RESEARCH ABSTRACTS

Report of Three Experiments in the Use of Television in Instruction, 1958-59 *Cincinnati Public Schools* 238

Television Research in the Teaching-Learning Process *Presley D. Holmes, Jr.* 238

Annual Report of Jefferson County and Kentuckiana Educational Television Projects, 1958-59 *Kenneth F. Lam and O. L. Shields* 239

An Inexpensive Method to Determine the Efficiency of a Television Program *Lawrence Myers, Jr. and Eric F. Gardner* 239

The Nebraska Experimental Program in the Use of Television and Correspondence Study, 1957-58 *The University of Nebraska* 240

Training Effectiveness as a Function of Simulator Complexity *John M. Newton* 240

Programming Verbal Skills for Primary Grades

HELEN M. POPP AND
DOUGLAS PORTER

This paper and illustrations were presented by Helen Popp as a visualized report to the annual convention of the Department of Audiovisual Instruction in Cincinnati last March. Mr. Porter is instructor in the Harvard graduate school of education where Mrs. Popp is research assistant.

IT IS NOT THE INTENTION of this paper to present the rationale for teaching machines nor to argue for their necessity or effectiveness. Statements of theory and experimental evidence are available elsewhere in the literature (Fry, Bryan, & Rigney, 1960; Holland, 1959; Porter, 1959; Skinner, 1958). Instead, some of the programmed materials which are being developed for teaching elementary verbal skills will be described with the intent of encouraging others to attempt similar work. It will become apparent that the programming techniques which have been used can be applied, in a fairly routine manner, to a considerable portion of basic skill instruction in the primary grades.

Three sets of programmed materials will be described: the first is a spelling program for the sixth grade which has gone through extensive experimentation; the second is a set of reading readiness materials based upon a currently published series with which we are experimenting; and the third is a set of self-instruction materials designed to reinforce reading for comprehension.

Since the format of all these materials is peculiar to one particular type of teaching machine it will be described very briefly (see Fig. I).

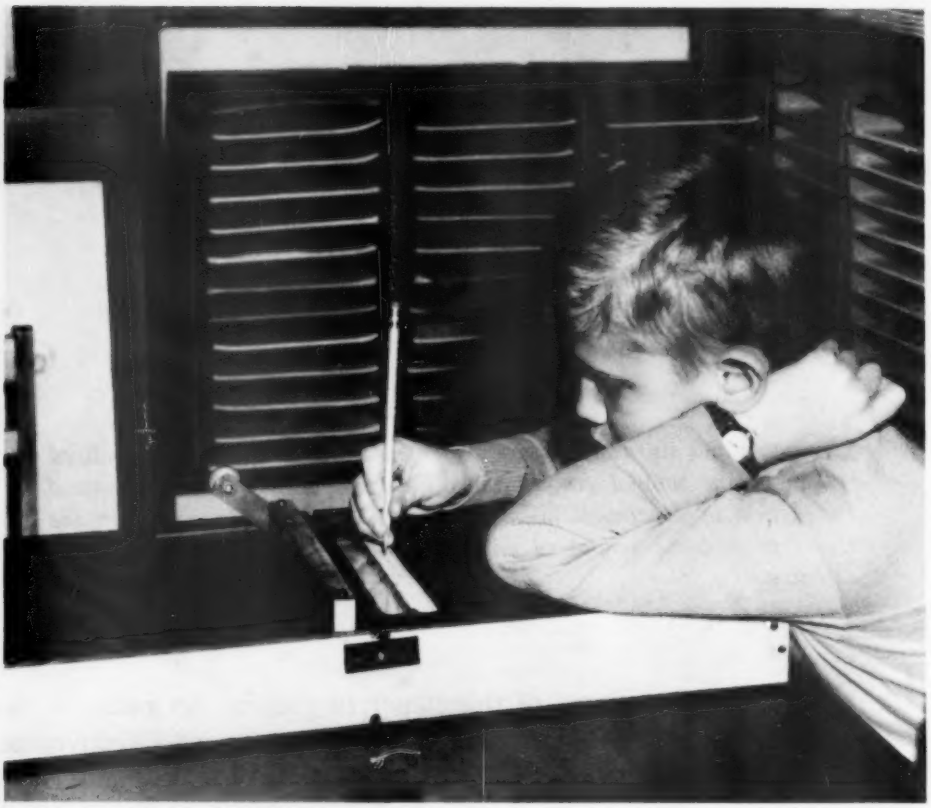

FIGURE I. *Teaching machine in use.*

For mechanical and financial reasons the machine is kept to maximum simplicity. Teaching materials duplicated on standard 8½ x 11 sheets are fed past two windows in the machine by a unidirectional drive mechanism. Responses are written directly on the teaching materials through the window nearer the student; operation of a lever moves the written response to the farther window under glass (so that it cannot be tampered with), and exposes the correct answer in the open window. At this point the student compares his answer with the correct answer, scores himself "right" or "wrong," and moves the lever to bring up the next item in the near, open window. The sole function of this "machine" is to provide immediate knowledge of results and at the same time preclude cheating by keeping students from having premature access to correct responses or other than the current teaching item. All of the programmed materials to be discussed, though they may require dif-

	THE BICYCLE TIRES
1	Underline these words: receive, tires, eighth. Dear Sir: I am writing to ask when I can expect to receive the bicycle tires I ordered on the eighth of April. tires eighth receive
2	John wrote the letter because: ( ) the tires were not good. ( ) they had not been received. ( ) he wanted his money back. (x) they had not been received.
3	Circle the words with the letters -ei- in them: receive depot freight article eighth view receive freight eighth
4	Circle the word that means to get something that is sent to you: depot send receiver tires receive purchase receive
5	Write the missing letters. They are all the same. When can I expect to r_c_iv_ the bicycle tires I ordered? receive
6	Write the missing letters. They are both the same. I ordered the t_res on the e_ghth of April. tires eighth
7	Write the missing letters. Both pair are the same. I did not rec__ve the tires even by the __ghth of May. receive eighth
8	Write the missing letters. When can I expect to r_c__ve the $%&O** !!! tires? receive

FIGURE II. *Sample items from the spelling program.*

ferent-sized frames, are designed for presentation in the above device, and although a number of teaching items will be presented in each figure a student would see only one item at a time.

The spelling materials were prepared to cover the same spelling words, reading vocabulary, and difficulty level as a conventional set of published sixth-grade materials. Within these limitations, the materials were programmed to require the sequence of responses illustrated in Figure II. It should be noted that Figure II does not present an entire teaching sequence, but a sample of the types of items contained in a complete sequence.

First of all, the pupil identifies the spelling words by underlining them in a meaningful sentence context consisting of a story to be read (Fig. II, Frame 1). After having responded to a series of items as in Frame 1, the pupil answers a question on the content of the story. This is to insure that he reads the story in addition to underlining the words. Third, the pupil is required to discriminate about the letter structure of the spelling words; in this case (Frame 3), he selects the words which have the letter sequence "ei" in them. Then he matches the appropriate spelling word to the given dictionary definition in order to doubly insure understanding of the word to be spelled (Frame 4).

Finally, after the correct meanings of the words have been reinforced and peculiarities of their structure responded to, the initial sentence contexts are again used to evoke the correct word, the missing parts of which are to be filled in by the pupil (Frames 5-8). Separate frames of this same nature require different letters to be replaced or more complete responses or review, depending upon the nature of the particular words studied. It will be seen that the balance of frames in Figure II are concerned with correct spelling of the "ei" sequence in "receive."

Although there are a number of subtleties of hinting and prompting in the spelling program which have not been mentioned and many ways in which it could be improved, this program, as it stands, demonstrates what may be accomplished with rather straightforward and easily applicable techniques.

The second set of experimental materials are a result of close examination of one current series of reading readiness exercises for use in the first grade or kindergarten. The exercises, entitled *Learning Letter Sounds,* are designed to teach the alphabetic representation of initial word sounds. It will be profitable to examine the original materials and what has been done with them in programming for self-instruction.

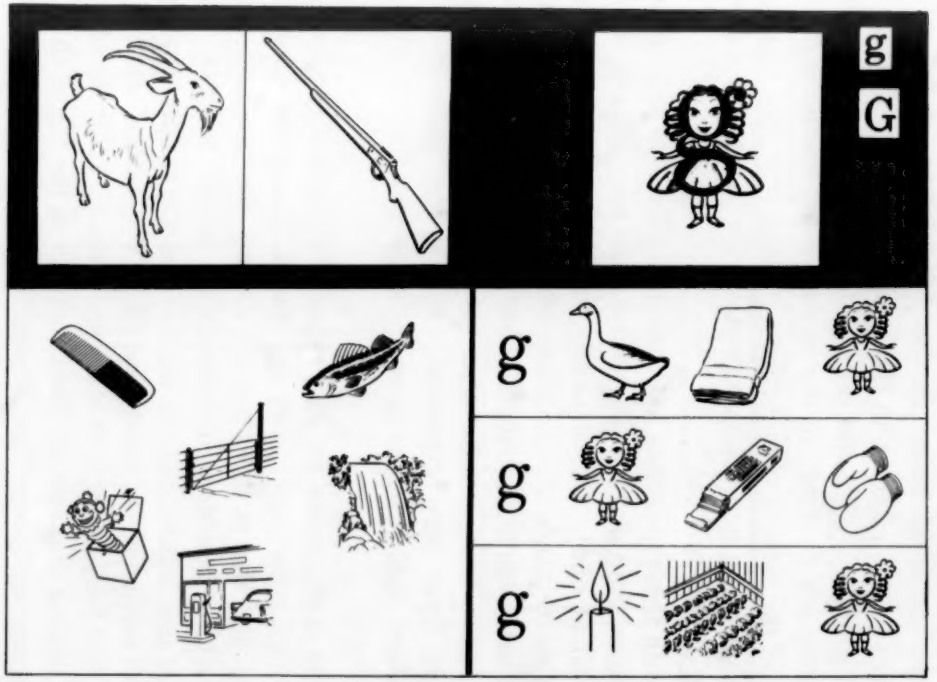

FIGURE III

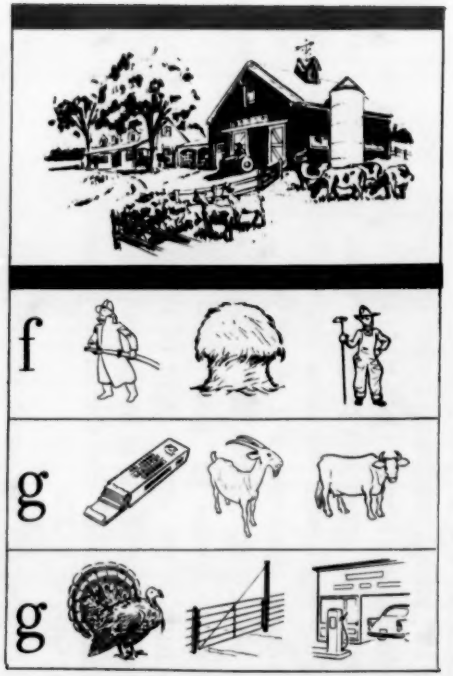

FIGURE IV

FIGURES III AND IV. *Sample of published reading readiness exercises.*

The sequence of exercises in the published materials is illustrated in Figures III and IV, which represent pages in a workbook.

On this page in the workbook (Fig. III), the teacher has the children name the objects in the upper left portion, "goat" and "gun," and then points out that they begin with the same sound. Next, the teacher names each of the objects in the lower left of the page, after which the pupils name the same objects to themselves and put a cross on those which begin with the same sound as "goat" and "gun."

Using the picture in the upper right of the middle page, the teacher next points out that "a letter 'g' is in the picture of the girl," and that in this way "you can remember that the letter 'g' has the sound you hear at the beginning of 'girl.' "

Finally, the pupils are required to respond under control of the letter "g" in two different ways: in the lower right of Figure III, they place crosses on the pictures in the row "which have a name that begins with the sound of 'g' "; and on the next page in the workbook (see Fig. IV) they are directed, in the words of the teacher's manual, to "put a cross on the picture of something in each row that you might see on a farm that has a name which begins with the sound the letter at the beginning of that row has."

Experience with these exercises has indicated that they require some rather complex directions and subtle performances which many children cannot master all at once. Consequently, in converting the exercises for self-instruction through the addition of immediate knowledge of results, two other essential changes have been made. The more complex tasks have been fractionated into components, and some of the sequences have been expanded. Again, the items in Figure V do not represent the entire program but are samples of what the program contains.

Initially, vocal instructions are just as necessary for these materials as for the exercises upon which they are based, but as the procedures become familiar and the pictures can be named, the program can be used in the teaching machines independently of the teacher. When the materials are first introduced the teacher has the children name the objects in the left section of the first frame (Fig. V), "goose" and "goat," and points out that they begin with the same sound. Then the children are directed to place a cross on all other pictures in the frame that start with the same sound as "goose" and "goat."

Following several frames similar to the first but utilizing other objects,

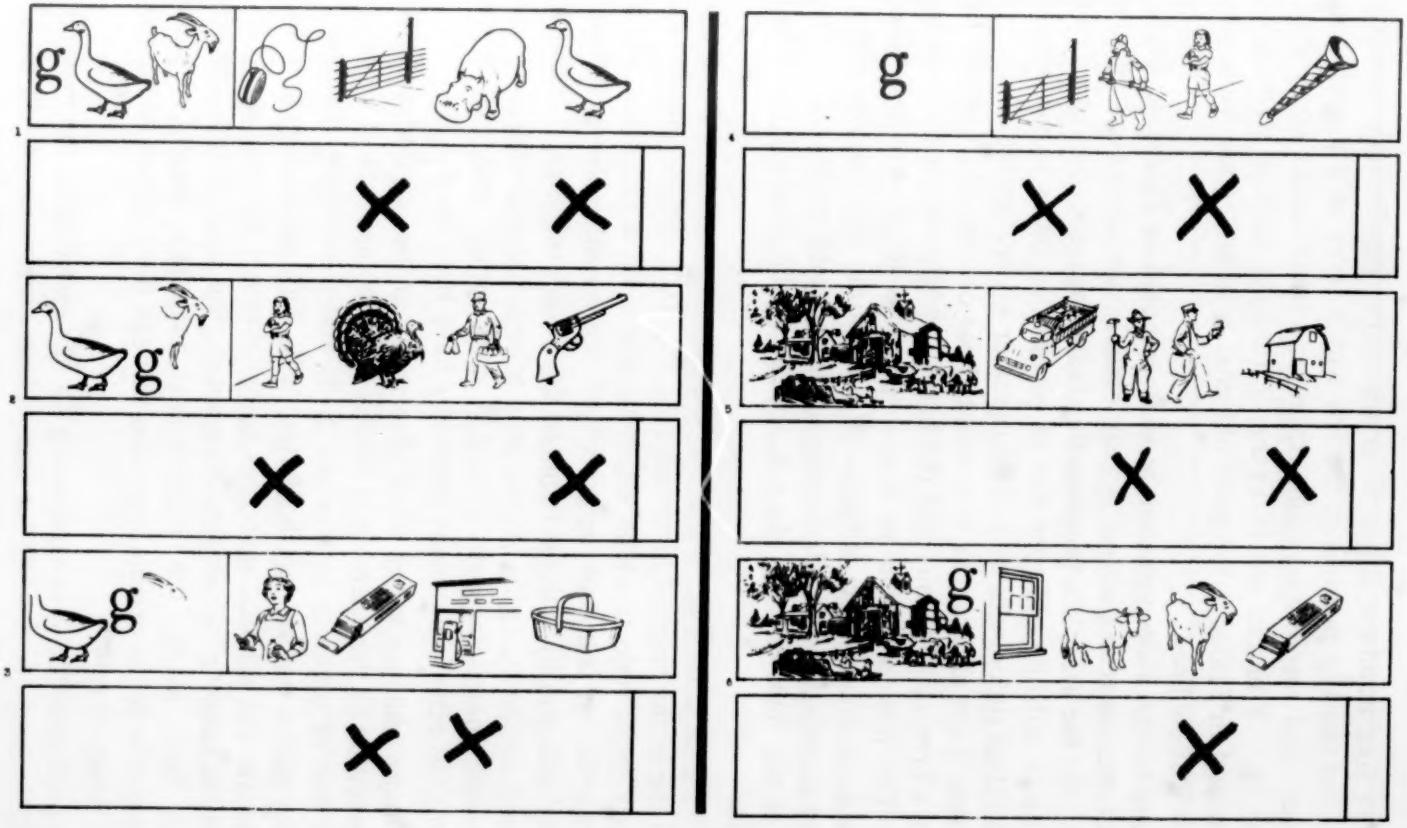

FIGURE V. *Sample of reading readiness exercises programmed for self-instruction.*

are frames like numbers 2 and 3 in which the pupil's task remains the same but the key pictures at the left which serve as a prompt are "faded out" and responses become more and more under control of the letter "g." You can see in Frame 2 that the goat is starting to disappear and in Frame 3 the poor old goat is almost gone while the goose has lost his head.

The end of this fading procedure is represented in Frame 4, where choice of the correct pictures is left entirely under control of the letter "g." In the complete program this fading sequence is carried out several times utilizing different sets of pictures in order to accommodate individual differences and obtain greater generalization.

In Frame 5 the child's task is to mark those objects which might be found on a farm—the farmer and the barn—irrespective of their initial sounds. The task is similar to that in previous items, but responses are to be made on the basis of thematic or semantic relationships rather than formal, initial-sound relationships. Items which present this component of the final exercise do not appear in the original published materials.

Finally, Frame 6 (Fig. V) is the programmed counterpart of the last exercise in the original materials (see Fig. IV). The student's task is to mark those objects which might be found on a farm *and* which begin with the /g/ sound of the letter "g." Since neither the "gum" nor the "cow" will comply with the required double contingency of thematic plus sound similarity, "goat" is the only acceptable response. In these programmed materials such a double contingency response is not required until after component behaviors have been taught.

The major changes which have been made in the original exercises are represented by the insertion of Frame 5 as a component of Frame 6, and the use of items as in Frames 2, 3, and 4 to bring the pupil's responses under control of the letter "g." This latter function was attempted in the original materials solely through the picture of the girl with the letter "g" superimposed upon it. But even if these changes had not been made, the programmed materials should produce results superior to the original exercises through the addition of immediate knowledge of results.

As a final example of programming for self-instruction, the materials designed to reinforce reading for comprehension are deceptively simple in appearance (see Fig. VI). They consist of passages from a conventional reading text with alternative choices of words at certain points,

	A BARBER'S DISCOVERY
1	Once there lived in a village a very fine barber named Garo. As he served his customers, Garo was always glad to give them advice. And as long as there was hair to cut or a beard to trim, he never ran out of things to *do* ( ); *say* ( ). *say* (x)
2	In those days a barber traveled from house to house like a peddler to do his work, so Old Garo had a chance to observe just what was occurring. For this reason his advice was considered *poor* ( ); *fair* ( ); *excellent* ( ). *excellent* (x)
3	Because Garo gave so much advice, people thought he was very wise indeed. And you may be sure that Garo agreed with them. He felt that he had no *chance* ( ); *equal* ( ); *friends* ( ). *equal* (x)
4	One November afternoon Garo was resting beneath a great oak tree. Yawning sleepily, he happened to glance upward. From the branches of the tree hung hundreds of tiny, brown acorns. At the first winter wind they were ready to *fall* ( ); *burst* ( ). *fall* (x)

FIGURE VI. *Items in program designed to reinforce reading for comprehension.*

coupled with the correct, confirming responses. For instance, in Frame 1 of "A Barber's Discovery," the reader has to choose between "do" and "say." A correct choice depends upon the reader having understood that the story is talking about Garo's verbal powers rather than his tonsorial skill, and it will be seen that this discrimination depends upon some rather subtle characteristics of the text; the reader must have understood that Garo liked to give advice, and that as long as he had customers to attend there was a welcome opportunity to "say" things, that is, give advice. Other frames in Figure VI are built on the same principle—alternative choices are presented for those words which have a maximum dependence upon preceding information and structure in the text. It is hypothesized that items of this sort reinforce the understanding of relatively large units of text.

Among the many possibilities, another criterion for selecting items might be to provide choices at the point of introduction of all new vocabulary items in a particular selection, irrespective of whether or not they appear in an extended context. This sort of programming might be used for teaching vocabulary and could better precede items of the sort in Figure VI. There are a number of other bases on which such materials can be constructed, but enough has been presented to give a flavor of the technique, and further hints can be obtained from the literature on "cloze" procedure (Taylor, 1956).

For the most part, the programs described here can be considered examples of "expediency programming," as distinguished from "research" and "commercial" programming. Research programming can be thought of as programming a particular subject matter or a part of it. Its purposes are not the practical ones of teaching required or useful subject matter, but to find out more about important psychological principles which will ultimately be useful in practical programming. This is a job for psychological experts on programming and a long neglected part of the work of educational psychologists. Commercial programming can be thought of as parallel to writing a text for publication, but it is more demanding since the programmer is forced to consider the students' responses to his program and is likely inclined to revise it on the basis of these responses. In the long run, most commercially available programs probably will be prepared by expert authors in the various academic disciplines, in consultation with psychological experts on programming, and will not be published until after extensive tryouts and revisions. For the expedient programming

of materials similar to those presented here, education should look to active teachers. Such expediency programming can proceed in much the same manner as that described in this paper. Select as subject-matter the best available spelling, reading, mathematics, or other text series in current use. Break the content of the series down into specific items, each requiring a student response, and present these materials in any teaching device which will make it possible to give immediate knowledge of results. Although the materials may be broken down into a large number of carefully prompted items, one should not expect to end up with a perfect program. Rather, one should expect to revise a program on the basis of experience and be glad that the technique makes revision possible.

Because audiovisual specialists have expert knowledge about teaching equipment and curricular materials, they are in an especially favorable position to facilitate expediency programming by active teachers. And since most schools have teachers on their staffs who would be interested in such work, it is hoped that teaching machine programs will soon be developed in many localities, aided and encouraged by the audiovisual staff.

REFERENCES

1. Fry, Edward B.; Bryan, Glenn L.; and Rigney, Joseph W. *Teaching Machines: An Annotated Bibliography*. Washington, D. C.: Department of Audiovisual Instruction, NEA (Published as Vol. 8, No. 2, Supplement 1 of the *Audiovisual Communication Review*), 1960.
2. Holland, James G. "Teaching Psychology by a Teaching-Machine Program." *American Psychologist* 14: 414; 1959 (Abstract).
3. Porter, Douglas. "Some Effects of Year-Long Teaching Machine Instruction." In *Automatic Teaching: The State of the Art*, edited by Eugene Galanter. New York: John Wiley & Sons, 1959, p. 85-90.
4. Skinner, B. F. "Teaching Machines." *Science* 128: 969-977; October 24, 1958.
5. Taylor, W. L. "Recent Developments in the Use of 'Cloze Procedure.'" *Journalism Quarterly*, 33: 42-48, 1956.

Teaching Ninth-Grade Biology by Television

JAMES N. JACOBS AND
JOAN K. BOLLENBACHER

Reported here is the second half of a two-year experiment with televised biology instruction in the Cincinnati public schools. One of the purposes of this second part was to test an improved design and compare results with the 1957-58 findings. The authors are both associated with the Division of Instructional Evaluation in the Cincinnati schools, Miss Bollenbacher as director and Mr. Jacobs as a Division assistant charged primarily with research.

SECTION I: DESCRIPTION, PURPOSE, AND DESIGN OF EXPERIMENT

THE 1957-58 EXPERIMENTS disclosed that a representative laboratory science such as biology was particularly fruitful for instruction by television because of its greater than normal dependency upon visual stimuli. Students could see the details of experiments and view a wide range of live and rare specimens. It was found that the more able groups tended to learn more by television than their counterparts in the conventional classroom. For other groups, instruction by television and by conventional methods was equally effective.

Two factors in the 1957-58 biology experiment were considered deterrents to the best utilization of instructional television. The first was the length of the telecast. Students and teachers alike felt that 50 minutes of televised instruction was too long. Students became less attentive and began to lose interest. Furthermore, since the telecast occupied the full class period, students did not have the opportunity to

obtain clarification on issues confusing them, nor were they able to discuss any aspects of the program until the day following. On these alternate, non-television days students could discuss topics and carry out laboratory experiments, but after a day's lapse questions were often forgotten and enthusiasm dampened.

The second inhibiting factor in the 1957-58 experiment was the design which precluded the teacher from viewing the televised lessons. While Teacher A taught Class 1 in the laboratory, Class 2 was simultaneously viewing a telecast. This procedure was reversed daily. The 1957-58 design resulted in the saving of teacher time in that the classroom teacher taught two classes during the same period. On the other hand, since the teacher was unable to view the televised lesson, she was at a disadvantage in articulating it with the laboratory lesson.

Description of the Experiment. The 1958-59 experiment eliminated the difficulties mentioned above. Telecasts were shortened from 50 to 30 minutes; thus, 20 minutes from the total 50-minute period were used for discussion and follow-up after each telecast. Secondly, the biology experiment was designed to permit the regular classroom teacher to view the televised lesson along with the class. Another favorable feature of this design allowed two separate biology classes to view the telecast simultaneously in a small auditorium-type situation. On alternate non-television days Class 1 met for laboratory instruction during one period followed by Class 2. Although this design resulted in some saving of teacher time it was not as economical as the previous one. However, it was felt that instructional advantages outweighed the economic disadvantages.

Purpose of Experiment. The purposes of the 1958-59 biology experiment were: (1) to determine the relative effectiveness of the conventional and televised methods of instruction in terms of pupil achievement; (2) to ascertain whether the changes in design—teachers viewing the telecast and shorter telecasts—would alter significantly the achievement results in comparison to the 1957-58 experiment; (3) to learn whether television instruction is more effective for groups of varying ability; (4) to determine the relative superiority of methods of instructions in terms of imparting knowledge of the true characteristics of science; and (5) to determine pupil and teacher attitudes toward television.

Design of Experiment. Four schools, which may be considered representative of Cincinnati schools where biology is taught, were se-

lected for the experiment. One of the four is classified as high in general academic ability, another relatively low, and the remaining two, about average. It should be pointed out, however, that students who take biology generally represent a rather homogeneous group, above average in ability.

Within each of the four schools, four classes were constituted on a random basis. One teacher was assigned to all four. Two of the four classes were randomly assigned to receive television instruction while the remaining two were assigned to receive conventional classroom instruction.

The course of study followed by all experimental and control classes was the same. An outline was distributed to teachers and students before the experiment began. Course content and pacing were, therefore, similar for experimental and control groups. The course consisted of the following units: *First Semester:* (1) The World of Living Things; (2) Cell Life; (3) The Plant Kingdom; (4) The Animal Kingdom; and *Second Semester:* (5) Human Biology; (6) Transmitting Life to New Generations; and (7) Man and Nature.

Four instruments were used in evaluating the biology experiment: (1) The Cooperative Biology Test, used in this study as a measure of student achievement; (2) the Facts About Science Test, to measure attitudes toward science and scientists; (3) Sizing Up Your School Subjects, used for measuring attitudes toward television; and (4) a teacher and student opinionnaire, used to survey the opinions of these groups with respect to critical issues regarding the acceptance of television. Each of the four instruments was administered to pupils by trained examiners. A detailed explanation of the function and use of these instruments will be made in the following sections.

SECTION II: EVALUATION OF TELEVISION AS A METHOD OF INSTRUCTION

Results of Achievement Test

The Cooperative Biology Test, used as the major criterion measure in this study, is designed "to provide objective and reliable measures of achievement" in biology. Two forms of this test were administered in the experiment: one was used as a pretest at the beginning of the school year; the other, which served as the final criterion of achievement, was administered at the end of the school year.

Methodology. The results of this experiment were analyzed using covariance techniques. Although pupils were assigned randomly to experimental and control classes, there is always the possibility, due to chance, that one of the two methods groups may prove to be superior to the other previous to the administration of the experiment. The methods of covariance analysis make comparisons possible between final scores after these scores are adjusted statistically so that the television and non-television groups are rendered equal with respect to initial levels of performance. The Cooperative Biology Test, Form X, was used in order to make appropriate adjustments relative to initial achievement in the final test scores of the Cooperative Biology Test, Form Y.

The methods of covariance analysis were used in a two-way classification of methods and schools. Before proceeding with the covariance technique, it was necessary first to test the validity of the assumptions underlying its use, namely: (1) homogeneous variability from one group to another, and (2) homogeneous regression among groups. This second assumption simply requires the relationship between the covariables and the final biology test to be the same from one group to another. When the validity of these assumptions was tested, it was found that both assumptions were valid. The performance of the two classes in each school being taught by the same method were pooled in the final analysis.

Results. The average scores made by the experimental and control groups in each of the four schools on the pretest (Cooperative Biology Test, Form X), are shown in Table 1.

TABLE 1. AVERAGE SCORES ON THE PRETEST, FORM X OF THE COOPERATIVE BIOLOGY TEST

		Methods Averages					
School	*Ability Level*	*N*	*TV*	*N*	*Non-TV*	*N*	*Combined Groups Average*
1	Below Average	46	43.50	46	42.84	92	43.17
2	Average	58	48.03	58	47.79	116	47.91
3	Average	59	44.50	59	44.43	118	44.47
4	Above Average	56	49.41	56	52.41	112	50.91
Total		219	46.47	219	47.02	438	46.74

Comparison of the total methods averages in Table 1 reveals that the total experimental and control groups were somewhat evenly

matched with respect to knowledge of biology before the experiment began. Although it is small, the difference between these two averages will be reconciled statistically in the comparison of the final test averages. It should be noted that the difference in pretest performance between the below average and above average schools is not of great magnitude in spite of large differences in pupil ability. This is simply a reflection of the fact that the more able students tend to elect biology. In interpreting the results for the so-named below average groups (whose average IQ is 101.2), it is well to keep in mind that this classification is only in reference to the ability level as it relates to the other experimental groups and not to the usual interpretation of intelligence quotients.

The results of administering the final or post-test, Form Y, of the Cooperative Biology Test, are shown in Table 2.

TABLE 2. AVERAGE SCORES ON THE POST-TEST, FORM Y OF THE COOPERATIVE BIOLOGY TEST

		Methods Averages					
School	*Ability Level*	*N*	*TV*	*N*	*Non-TV*	*N*	*Combined Groups Average*
1	Below Average	46	52.98	46	50.30	92	51.64
2	Average	58	60.38	58	58.26	116	59.32
3	Average	59	54.86	59	53.19	118	54.03
4	Above Average	56	62.54	56	63.57	112	63.05
Total		219	57.89	219	56.58	438	57.24

The differences in results between Tables 1 and 2 obviously reflect the results of one year of instruction. It should be noted that although the average pretest score of the experimental group is slightly less than that of the control group, the final total post-test average of the experimental group is somewhat higher than that of the control group. The averages shown in Table 2 are not as yet adjusted relative to initial levels of ability.

Analysis of Results. The analysis of this experiment is contingent upon the results of two statistical tests. The first determines whether the difference in achievement between the experimental and control groups, after appropriate adjustments have been made, is due to chance variation or whether the difference is a true reflection of the differential effectiveness of the two methods. The second statistical test, the test

of interaction, determines whether the effectiveness of the two methods of instruction is uniform from one level of ability to another. (An overall test of a significant difference between methods of instruction would be meaningless unless it were shown that the superiority of one method over the other was uniform for varying levels of pupil ability.)

An analysis of the significance of interaction produced an F ratio of .09 with 3 and 431 degrees of freedom. Interaction, therefore, was found to be non-significant, indicating that the relative effectiveness of methods was consistent from one level of ability to another.

The analysis of covariance, testing for the significance of difference between methods averages, is shown in Table 3.

TABLE 3. ANALYSIS OF COVARIANCE OF POST-TEST SCORES ADJUSTING FOR INITIAL LEVELS OF MENTAL ABILITY

Source of Variation	*Sum of Squares of Errors of Estimate*	*Degrees of Freedom*	*Mean Square*	*F Ratio*	*F Ratio Required at 5% Level of Significance*
Between Groups + Error	16854				
Residual Within Groups (Error)	16530	429	38.5		
Adjusted Methods Averages	324	1	324	8.43	3.86

The F ratio of 8.43 indicates a significant difference between methods of instruction; thus, when appropriate adjustments in final achievement are made relative to initial levels of achievement, the television method of instruction appears to be superior to the conventional classroom method.

The difference in the two methods for each school, after the appropriate adjustments were made, are seen in Table 4.

TABLE 4. POST-TEST AVERAGES ADJUSTED ACCORDING TO INITIAL LEVELS OF ACHIEVEMENT

School	*Ability Level*	*Adjusted Methods Averages*		*Difference*
		TV	*Non-TV*	*(TV − Non-TV)*
1	Below Average	55.96	53.88	+2.08
2	Average	59.21	57.30	+1.91
3	Average	56.84	55.57	+1.27
4	Above Average	60.09	58.38	+1.71
Total		58.10	56.39	+1.71

It was the total methods averages of 58.10 and 56.39 for the television and non-television groups respectively which were tested in Table 3 and shown to be significantly different.

It is interesting to note that although the test of interaction was shown to lack significance, nevertheless, it appears possible that the below average school was benefiting slightly more. This conclusion may not be drawn directly from the results of this experiment; however, in light of past results, it appears tenable.

Discussion and Conclusions. A comparison of the results just presented with those of the 1957-58 experiment reveals what on the surface appears to be a contradiction. In the earlier experiment the television method proved more successful for the above average pupils and lacked significance of difference for the average and below average pupils. The present experiment, however, indicates the superiority of the television method for all levels of ability. These results may be interpreted reasonably in terms of the change in design if the shorter telecast is presumed to be of greater benefit for the below average pupils who may have shorter attention spans. Since the same methods of analysis were used in both experiments and since the same schools and teachers were involved, valid comparisons may be made. In the earlier experiment, the difference in final test averages for the television and non-television groups in the below average school was .66 favoring the conventional classroom method of instruction. In the present experiment the same school yielded a difference of 2.08 favoring the television method.

The more able pupil, for whom a shorter telecast possibly is not necessary, still tends to benefit more by the television method, although not as much as in the 1957-58 experiment. The average difference in the television and non-television groups in the same school in the 1957-58 experiment was 4.16 in favor of the television method, while in the present experiment, the average difference is 1.71. Obviously the above average pupils did not gain as much through the change of design as did those whose ability is below average.

Although the difference in length of the telecast is considered the primary factor for the final results of this experiment as compared with the 1957-58 experiment, the effect of the teacher viewing the telecast cannot be overlooked. It is likely that the combined effects of at least these two factors produced the uniform superiority of the television method of instruction over the conventional method.

Fundamentally, these results seem to indicate that both television and conventional classroom methods must be adapted to the unique abilities and characteristics of the pupils for whom the instruction is intended.

The conclusions to this aspect of the experiment may be stated as follows:

1. The television method of instruction was found to be significantly more effective than the conventional method.

2. The superiority of the television method was uniform for varying levels of pupil ability.

3. The lack of a significant interaction between methods of instruction and levels of pupil ability is attributed primarily to shorter telecasts and to teachers viewing the telecasts.

The Facts About Science Test

One of the important goals of instruction in science, in addition to imparting knowledge in a specific discipline, is to give a clearer understanding of the methods and attitudes that characterize science and scientists in our culture. It is not uncommon, for example, for students to identify the scientist as the eccentric individual at odds with society. A more realistic view of science as a discipline and of scientists as people is an important aspect of instruction in any science.

The degree of growth from misconception to clearer understanding about science was measured by a test called Facts About Science, published by the Educational Testing Service. This test was administered both at the beginning and the end of the school year.

Methodology. Covariance techniques were used to analyze the results. The various assumptions necessary for valid tests of significance were tested and found to be tenable.

TABLE 5. AVERAGE PRETEST SCORES ON THE FACTS ABOUT SCIENCE TEST

School	*School Ability Level*	*Methods Averages*					*School Average*
		N	*TV*	*N*	*Non-TV*	*N*	
1	Below Average	45	43.09	45	41.44	90	42.27
2	Average	54	44.78	54	43.85	108	44.31
3	Average	58	46.07	58	44.28	116	45.17
4	Above Average	53	49.38	53	51.89	106	50.63
Total		210	45.93	210	45.48	420	45.71

Results. Table 5 presents the average pretest results of the Facts About Science Test for the television and non-television groups.

The total methods averages of 45.93 and 45.48 for the television and non-television groups respectively indicate that, on the whole, the experimental and control groups were evenly matched. The difference between methods within each school is largely a function of the mental ability of the groups involved.

The results of administering the same test at the end of the school year are shown in Table 6.

TABLE 6. AVERAGE POST-TEST SCORES ON THE FACTS ABOUT SCIENCE TEST

School	*School Ability Level*	*Methods Averages* *N*	*TV*	*N*	*Non-TV*	*N*	*School Average*
1	Below Average	45	45.16	45	42.47	90	43.81
2	Average	54	48.78	54	48.85	108	48.81
3	Average	58	47.71	58	46.17	116	46.94
4	Above Average	53	51.57	53	54.25	106	52.91
Total		210	48.41	210	48.10	420	48.26

Inspection of Table 6 indicates again that the total methods averages for the experimental and control groups are the same. Little adjustment in final averages will result because of the near equality of the pretest averages.

Analysis of Results. The analysis to test the significance of interaction between methods and schools produced an F ratio of .73 with 3 and 411 degrees of freedom. Interaction effects were, therefore, declared non-significant. The covariance analysis testing the significance of difference between methods averages is shown in Table 7.

TABLE 7. ANALYSIS OF COVARIANCE OF POST-TEST SCORES ADJUSTED FOR PRETEST SCORES ON THE FACTS ABOUT SCIENCE TEST

Sources of Variation	*Sum of Squares of Errors of Estimate*	*Degrees of Freedom*	*Mean Square*	*F Ratio*	*F Ratio Required at 5% Level of Significance*
Between Groups + Error	12451.03				
Residual Within Groups (Error)	12450.46	411	30.29		
Adjusted Methods Averages	.57	1	.57	.02	3.86

The F ratio of .02 is not significant at the 5 percent level; thus, it appears that the televised and the regular classroom methods of instruction are about equally effective as measured by performance on the Facts About Science Test.

The adjusted post-test averages are shown, as a matter of interest, in Table 8.

TABLE 8. POST-TEST AVERAGES OF FACTS ABOUT SCIENCE TEST ADJUSTED RELATIVE TO PRETEST PERFORMANCE

School	*School Ability Level*	*Methods Averages* *TV*	*Non-TV*	*School Average*	*Difference (TV − Non-TV)*
1	Below Average	47.29	45.94	46.61	+1.35
2	Average	49.53	50.36	49.95	− .83
3	Average	47.41	47.34	47.37	+ .07
4	Above Average	48.58	49.22	48.90	− .64
Total		48.23	48.29		− .06

Discussion and Conclusions. In view of the small amount of time devoted in direct instruction to the type of learning measured by the Facts About Science Test, it is not surprising to find no significant differences between methods of instruction.

However, the difference in the below average school favoring the television method of instruction is at least suggestive, especially in view of previous findings. (The difference is only suggestive because it has already been established that no significant differences exist as a result of the test of the over-all null hypothesis.)

The conclusions may be stated as follows:

1. There were no significant differences in the two methods of instruction as measured by the Facts About Science Test.

2. There were no significant interaction effects between methods of instruction and levels of pupil ability.

Evaluation of Pupil Attitudes

An attempt was made to measure certain attitudes toward biology through the administration and analysis of an instrument called Sizing Up Your School Subjects (also developed by the Educational Testing Service.) This instrument consists of ten items, each intended to measure certain dimensions of attitudes toward school subjects. Every item requires the student to rate each of his school subjects in terms of the

question presented. For example, in reacting to the question, "How do you like the subjects you are now studying?" the student would indicate the subject he likes best, second best, least, second least. Any further subjects taken would be relegated to a neutral classification.

The unique feature of this instrument is that at no time is the student aware of the fact that he is rating television instruction. In order to insure the fidelity of responses and to prevent identification with the television experiment, the test was administered in ninth-grade algebra classes in each of the four experimental schools. (Almost every pupil in the experimental and control groups was taking algebra and English in addition to biology.)

Methodology. After administration of the test, the responses made by the television and non-television groups were singled out for analysis. Scoring was accomplished by assigning a numerical rating of 3 if biology was rated higher than both algebra and English; 2 if biology was rated higher than either of the other two; and 1 if biology was rated below both English and algebra.

The methods of analysis of variance were applied to the data to determine the significance of observed differences in averages between methods and for the interaction between methods and schools. In analyzing each item, the first step was to determine the significance of interaction. As explained earlier, the meaning of a significant interaction is that the responses made by the various methods groups differ with different schools. Under such conditions, no generalized statement may be made relative to the over-all effectiveness of one method of instruction over the other. When a significant interaction was detected, individual t-tests determining the significance of difference between methods within schools were made.

Results and Analysis of Individual Items. Since each item of the attitude measure was analyzed separately, the items and the results of analysis are stated and interpreted individually below.

1. How do you like the subjects you are now studying?

Responses to this item indicated a significant interaction. Individual tests of significance indicated that the television and non-television groups in the two average ability schools lacked significance of difference. In the below average school, however, the television group liked biology significantly more than did the non-television group,

whereas in the above average school, the non-television group indicated that they liked biology more than did the television group.

In the 1957-58 experiment all the groups receiving regular classroom instruction tended to like biology more than did groups receiving televised instruction.

2. How much time do you actually spend on the subjects you are now studying—both at school and at home?

Both the tests of interaction and for differences between methods were found to lack significance between the television and non-television groups. Apparently both methods of instruction result in about the same amount of time devoted to study.

In the 1957-58 experiment, the television groups in the below average school spent less time studying biology than did the non-television group, while in the above average school, more time was spent by the television groups in studying biology.

3. How often do you have a chance to ask the teacher questions in your different subjects?

This item showed a significant interaction although the difference between methods in only one school was found to be significant. This significant difference was in the above average school where the television group felt that they had less chance to ask the teacher questions than did the non-television group.

All schools in the 1957-58 experiment felt that they had greater opportunity to ask questions in the conventional classroom situation than they did during televised instruction. These results represent a significant shift in attitude and reflect, probably, the shorter telecast which permitted questions and discussion immediately following the telecast.

4. How often do your subjects (classroom and homework) keep you from taking part in outside activities you would rather do?

Analysis of this item showed a significant interaction. Significant differences between methods groups were lacking in three of the four schools. In the fourth school, the above average school, the television method of instruction was looked upon as keeping students from taking part in outside activities to a greater extent than did the conventional method. The very same result was found in the 1957-58 experiment.

5. How easy to learn are the subjects you are now studying?

This item also showed a significant interaction. Individual tests indicated a lack of difference between methods for the schools of average ability. In the below average school, the television method was looked upon as being the easier from which to learn, while in the above average school, the conventional method proved to be the easier. These results are consistent with the 1957-58 experiment, with the exception that in the latter, the below average school showed no significant differences between the two methods of instruction.

It appears that although the school with students above average in ability continues to view television as the more difficult method of instruction, the below average school has shifted its attitude from equal effectiveness of the two methods to a view of television as the method more conducive to learning.

6. To what extent do you consider your different subjects useless to you?

Analysis of this item indicated a lack of significant interaction but showed a significance of difference between methods of instruction. It was found in all schools that the non-television method of instruction was rated higher than the television method in terms of subjects being useless.

In the 1957-58 experiment the reaction to this item was reversed. The television groups then felt biology to be less useful than did pupils in the non-television groups.

7. To what extent is the teaching in your different subjects clear and understandable?

Interaction effects were shown to be significant. The above average school was the source of this significant interaction. Differences between the three remaining schools lacked significance. In the above average school, the pupils felt that the conventional method resulted in more understandable teaching than did instruction by television.

The results of this item in the 1957-58 experiment indicated that each school felt the classroom method of instruction to be superior to television in terms of clarity and understanding.

8. How much serious discussion among students goes on in class in your different subjects?

A significant interaction resulted in the analysis of this item with the below average school lacking significance of difference between methods. In the two average ability schools, the television classes felt that more serious discussion took place than did the non-television classes. In the above average school, more serious discussion took place within the non-television groups.

The 1957-58 results showed, categorically, that regular classroom instruction was regarded as more conducive to serious discussion than was the television method.

9. How much does your mind wander in your different subjects?

Analysis of this item showed the interaction and the methods differences to lack significance; thus, the degree to which students felt their minds wandered was equal in both the television and non-television groups.

Biology pupils viewing television in the 1957-58 experiment felt that their minds wandered more than did pupils taught by regular classroom procedures.

10. How much do you learn from your different subjects?

Methods differences and interaction effects were found to lack significance of difference. It may be said, therefore, that the degree to which students feel they learn is the same for the television and non-television methods of instruction.

The 1957-58 experiment showed that the non-television students felt they learned more biology as compared to the pupils who viewed television.

Discussion and Conclusions. The most striking result of the analysis of this instrument is shown in the comparison of responses made by students in this year's experiment and those made last year. It should be pointed out once again that not only the same schools but also the same teachers were involved in each of the experiments. Thus, the comparativeness of the data is well justified. On the whole, students in the present biology experiment have reacted with more favorable attitudes toward television than they did in the 1957-58 experiment. It is likely that the more favorable reaction resulted from the shorter telecast and from the classroom teacher's viewing the television lessons along with the classes and conducting class discussion immediately following the telecasts. It should be noted also that teachers were

more familiar with television instruction, since this was their second year in the experiment.

The results are perhaps of greatest significance when it is recognized that the below average school showed the most pronounced shift in attitude toward television. In the 1957-58 experiment the below average as well as the average and above average schools were, on the whole, relatively unimpressed with instruction by television. This year the below average school showed a significant shift toward positive attitudes.

Negative attitudes toward television were not expressed in any single comparison for pupils of average ability. This neutral attitude for preference of methods of instruction probably reflects the importance of the level at which instruction is geared.

In general, analysis of the above average school showed somewhat negative reactions toward television instruction. In all items which resulted in significant interactions, the above average groups represented, in part or in total, the source of this interaction. On the basis of conclusions reached in the analysis of achievement test results, the negative attitudes of the above average students are consistent with test findings. If one accepts the premise that television instruction was geared more to the below average than to the above average pupil, it becomes evident that any negative attitude toward television instruction probably would be expressed by the student of above average ability.

One rather surprising result of this analysis is the lack of significant differences observed in Item 10, "How much do you learn from your different subjects?" One would expect this item to be correlated highly with Item 1, "How do you like the subjects you are now studying?" Since Item 1 showed significant differences existing within the below average and the above average schools, the former favoring television instruction and the latter favoring conventional instruction, one would expect similar results for Item 10. Perhaps liking and learning a subject are somewhat independent attributes. More plausible, perhaps, is the explanation that the degree of learning that takes place can be more equally and objectively gauged than is the degree to which a subject is liked. Liking something seems to be a matter of emotional acceptance and therefore more subject to positive or negative biases.

Analysis of the results of this instrument seems to justify the following conclusions:

1. Pupils with below average ability tend to prefer television while above average students tend to favor conventional instruction. There were no significant differences between methods for average ability pupils.

2. Both methods of instruction appear to result in the same amount of time spent in studying biology. This statement holds true for all levels of pupil ability.

3. Only pupils of above average ability felt that the conventional method provided a greater chance to ask questions. For all other groups, no significant differences between methods were found.

4. Only in the above average school was the television method viewed as keeping students from taking part in outside activities.

5. Students in the below average school felt that it was easier to learn through television instruction while in the above average school students found the traditional method more amenable. No significant differences existed among average students.

6. Students in all schools who were instructed by television felt that biology was more useful than did pupils in the non-television classes.

7. Students in the above average school felt that clearer and more understandable teaching resulted from the conventional method than from television. No significant differences in terms of clarity and understanding were expressed in the average and below average schools.

8. Students of average ability tended to feel that television instruction resulted in more serious discussion than did students taught by conventional methods, whereas students in the above average school considered the regular classroom method more productive in this respect. In the below average school, there was no significant difference.

9. The degree to which a student feels that his mind wanders seems to be equal for television and non-television instruction.

10. No significant differences between methods were noted in terms of the degree to which students thought they had learned biology.

ETV Research in the Decade Ahead

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SINCE EDUCATIONAL TELEVISION is one of the miracle children of the mid-twentieth century, it is logical to find in its development some problems which are generally characteristic of our time. My concern at this point is with the growth of television for educational use, and specifically, with the restraints which I now see limiting its development in the decade ahead.

Often it is repeated that man is slow to grasp new ideas, or even to use new inventions. Certainly this is not a complaint of those who have watched the growth of educational television during the past ten years. Rather, the question is whether in implementing this change in education, there has not been a failure to meet the challenges and the opportunities offered.

The difficulty as I see it does not arise from change itself, but from the nature of this particular change, its rapid tempo and complex machinery, both of administration and accomplishment required. This complexity makes it easy to submerge all effort and resources into the doing, the measuring, and the communicating about the doing and the measuring. There is no place left for thinking about what we have done or where we are going.

Generalized, this sounds obvious. Let us examine in more detail how this applies to the educational television scene. In the following pages, I will attempt to show that in our speedy and unthinking embrace of this new technique, it has been stereotyped as a solution to

money and number problems in education, and that there has been an almost complete disregard for first questions, basic ones about the nature of this truly new medium. For certain biases have bent the twig unduly, and influenced the course of experimentation and research. And here, as in any situation, the questions formulated predetermine the answers we obtain, and strongly influence the image of educational television which results.

Before pinpointing what is wrong with the image of educational television or suggesting how it may be broadened, there is reason to review what the present picture is. Using as our basis the research and predominant activities within the field, how is "educational television" perceived?

Primarily, educational television has its widest support as an electronic extension of classroom-style teaching of the "best teacher" to the "most" students, generally for formalized education, and justified most often on a purely economic basis.

True, in the early days there was much talk of discovering dynamic ways of using television, and of bringing mass cultural efforts to the masses out of school. But today, with over 40 stations on the air and hundreds of schools using television, close examination of the kind of broadcasting, the sources of support, and the growth in closed-circuit systems reveals a concept of TV as a device primarily of educational expediency.

A detailed study or a glance at the reports and studies done in the past ten years reveals more. There one can see the kind of questions asked. For rather than trying to find out how to improve the quality and enlarge our vision of imparting information with this new and valuable tool, we have proved over and over again that television can extend the teacher beyond the limit of one moment and one place, and still teach. An obvious conclusion, but for emphasis, let us examine its ramifications.

The first major study of teaching by television occurred in 1949, and engaged three Naval Air Stations in an evaluation of TV for mass training. The Navy asked, "Do men taught by television learn as much as men taught by conventional instruction?" And the reply, a familiar one: ". . . 80 percent of comparisons showed television as good or better than conventional classroom instruction"(3). In the ten years since this study, the question has been amplified, modified, restated, and extended in its application to a multitude of educational situations.

A perusal of the AVCR Research Abstracts, the NAEB Fact Sheets, or any other research summaries, shows the enormous repetition of this question. And as a result we now know that television can be used to teach high school students, elementary pupils, the Army, the Navy, college students, housewives, student teachers, and IBM salesmen. It can act as a conveyor of learning for subjects including home nursing, physics, algebra, dress making, college composition, typewriting, psychology, and maintenance of military telephones. It can do this, amazingly enough, in Florida, Alabama, Pennsylvania, Illinois, California, and even Canada, England, and France. And apparently students can learn at 6:30 a.m., noon, late afternoon, the early evening, or late at night. We have no examples as to the effects of high altitudes, teaching in Urdu, or the applications to pinball machine maintenance, but these will undoubtedly be forthcoming since research projects are multiplying like rabbits throughout the country (and I might add, just as indiscriminately).

True, a number of other questions have been asked and researched, but they are of minor importance since they are infrequent in occurrence, and the results are little regarded. In most cases, even these different questions are still offshoots of the old "can television mass-teach" query, and thus have little over-all effect on enlarging a concept of the nature of television in education.

In trying to clarify and extend our thinking I do not wish to imply that all of the past research has been useless, nor do I wish to diminish the importance of television as an electronic tool to extend the formalized educational situation. This, educational television is, most certainly. It has applications of tremendous import to problems of mass education, overcrowded classrooms, overloaded teaching schedules and over-extended budgets. But television used in education can be much more. It offers an opportunity to teach better, to reorganize material for faster and for different kinds of comprehension. It may actually affect the ordering of knowledge itself, and not merely multiply and transmit more widely our old manners and mistakes.

To amplify, let me introduce two terms to describe the kinds of investigations we are and are not doing. They are: *internal research* and *external research*.

Internal research is concerned with factors occurring within the television presentation. Primary concern here is not with what happens to the viewer, but how the material is brought together, organized,

presented, and made a complete visual-aural unit. The questions inherent here are fundamental ones of learning and teaching—organization for visual, aural presentation, idea density, word level, the television teacher, visual practices, relationship of the visual to the aural, and many other questions basic to learning and teaching through a medium that enables one to "streamline" the message.

External research involves questions external to the presentation. Here one is concerned with effect, retention of subject matter, comparisons with traditional teaching, faculty and student attitudes, administrative problems, costs, techniques and mechanics of integrating television into the curriculum, the physical set-up for viewing, and many other factors.

Both are interrelated, but there is an important distinction between the two kinds of concerns. To extend the illustration let us apply it to printing, a medium so much a part of our culture that we have an unconscious understanding of its nature.

Concern with external factors in printing would find research on questions such as whether people can learn from reading, who reads books, the nature and cost of publishing, testing of reading to learn whether it communicates in lower grades as well as on upper levels, and comparing reading a lesson to hearing it spoken to see if learning occurs at both times.

Internal concerns would be questions on the nature of communication by writing, how ideas are best conveyed by words, what constitutes good writing, how illustrations enhance the writing, how writing for books is accomplished, and so on.

While obvious, such a comparison helps to delineate the situation. We in educational television have been mostly measuring our tool, not giving a whit about understanding its nature.

If one examines the research of the past ten years one sees that a large percentage falls into the "external" area. This trend seems to be continuing in the grants under Title VII of the National Defense Education Act. Out of 31 TV proposals approved within the past year, one can make a rough analysis of the kind of research studies that are currently being supported (2). Some are difficult to classify (by the brief titles provided) but it seems clear that 26 of the 31 are concerned with external factors. In other words, 84 percent of the research is aimed at measuring factors external to the presentation itself. Only 5 (16 percent) examine internal factors.

Before suggesting specific areas of research to broaden this vision, we should consider an essential question. Why has our view been so limited? As I mentioned in the beginning, one factor is that television is yet young and has grown so rapidly it has used up its thinking time. But there are other reasons.

I refer to these as biases, biases which force our questioning into well-defined directions and restrain it from others. The biases are three: *measurement; disarticulation;* and *philanthropic.*

The measurement bias implies that unless there is something to be measured, nothing worthwhile can be learned. We have a bias in favor of the numerically tabulated questions and answers to neat curves and figures significant to a specified number of places. While this is important, there are many things we have not found ways of measuring. And it is precisely in this area of the non-quantifiable that there are questions which should be studied.

I recently attended a meeting concerned with ETV research where participants were urged to pay more attention to their experimental design, since this was reported to be consistently the weakest aspect of research proposals. No mention was made of the importance of the hypothesis that was to be tested. The impression was strong that only questions which provide measurable answers are worth consideration.

This is unfortunate because the central core of important problems in ETV pose the exact opposite—unmeasurable questions. What we often need to know does not fit into a perfect experimental design. Nonetheless the narrow and peripheral problems make neat experiments and thus continue to be studied. To be so completely subject to method is not science, but scientism. To escape this bias is to support different kinds of research: analytical, speculative, even subjective studies. The value in non-quantifiable areas will be in large numbers of people verbalizing, thinking about, and applying themselves to questions we usually skirt.

The second, the disarticulation bias, arises from the multiplicity and dissimilarity of the specialties involved in teaching by television, and the present lack of people with a broad grasp of a number of these fields. Educational television is a complicated endeavor, when all that goes into one single presentation is analyzed. Creating worthwhile hypotheses and research designs out of this complexity requires more background knowledge than we superficially recognize.

Most of the research questions are posed, or at least articulated, by specialists in research. While some have experience outside their vastly technical field, usually they are not qualified to originate questions. Many will not. But when they bring in other people, difficulties are again encountered due to our great specialization. The television teacher in general knows only the content area, the media person is concerned with strictly "television" problems, the administrator with application problems. In other words, in educational television as in almost no other field one can name, a mountain of concerns, viewed from a multitude of sources, are all brought together into the "production." The remedy involves no pat answer. It encompasses the idea of developing individuals with a broad grasp, who are not themselves just a piece of the puzzle, but generalists who bring the pieces together and see the whole picture. It envisages content persons becoming experts in television; psychologists becoming experts in the potentialities of the technique they are testing as well as of the subjects they test. It suggests that our television curriculum in communication schools should not occupy itself solely with the mechanics of getting "programs" on the air. The educational television person must be a breed apart, and so far we have not demanded this. Perhaps simply because we have not faced the realization that education by television can be a masterful art, and that as in all art, the artist must be a unifier, an organizer, an articulator.

The third bias, the philanthropic one, arises from the influence, much of it unconscious, resulting from the source of funds for educational television research. Primarily, funds for extensive research in ETV have so far come from organizations who were interested in testing very specific aspects of TV use, that is, for easing imperative school problems. While such subjects certainly need testing, there is little doubt that most of the study grants have tended to move the development of educational television along "directed" lines rather than to explore its nature or test its range.

It is obvious that the vision of those who support research affect our understanding of the medium. For often, institutions and individuals seeking grants for research must discover first what type of projects will be supported, then design their experiment. Frequently proposals outside well-accepted limits are useless to make. If a large teaching class is the experimental area which will obtain support, then actually it is not surprising that numbers of projects center here.

The philanthropic bias is strong enough to actually change the natural evolution and growth which could be visualized in television experimentation. While one cannot actually question the right of foundations or the government to encourage research with specific aims in mind, it is constructive to point out that their responsibility in so doing is great. For in a medium as expensive to use as television, what is not supported is not explored.

But suppose by verbalizing some of the biases which have affected us, we can overcome them? What then? What specifically are the kinds of questions and research which will be engendered? I obviously cannot predict with any accuracy, but I can say what kind of questions and research I hope will be undertaken in the decade to come.

The next major effort in educational television research should arise out of the complex of questions which considers what the nature of television's pictorial-verbal communication really is. In short, the emphasis in ETV research should change from "external" to "internal."

This is important because in much of our research, we have been acting as though the content of TV and the content of classroom instruction are essentially the same. And yet we do know that there are some major differences between what is communicated by television and what is communicated in other ways—or at least, that there can be differences.

In a study by Edmund Carpenter of the University of Toronto, and reported in *Explorations VII* (1), he pointed out that the medium of communication affects the content to such an exent that it can really be considered a part of the content. Or, "the envelope is a part of the message." In other words, if a medium is to be used to its best advantage, it will "say" different things from what would be "said" in another medium. As Carpenter comments, the content is not a sheet of paper which can be transferred from the envelope of one medium to another without modification. A change in medium is a change in content.

Such investigation into the pictorial-verbal nature of communication has not been thoroughly explored, even in "instructional" films. And in TV, we are still trying to find pat formulas for making material appealing and different by omitting blackboards, and leaving out the impedimenta of old style "teaching"—this, instead of finding concepts of how to use television through understanding of the medium and its effect on content.

Under this pictorial-verbal study there might be at least two general areas of concern: *potentialities* and *pedagogy*.

The first, potentialities, involves us in studies which will provide academic description and clarification of what television can do best, and cannot do. It will provide information about the nature of TV communication, and will give us some insight into what we are communicating.

Let me be specific. For the sake of familiarity let us take a poet and a poem, both well-known: Robert Frost and "Birches." Without extensive thinking, one can visualize six very different types of experiences which could be presented by television relating to this material. For example: (1) An excellent teacher reads and discusses the poem and leads in an analysis of its content. (2) New England birch country and seasons illustrate the poem through film. (3) Robert Frost reads and converses about his poem. (4) A panel of students discuss the poem with a teacher. (5) An actor reads the poem with dramatic emphasis. (6) The actual words of the poem are shown on the screen and analyzed as to word choice, rhythm, length of line.

None of these are unusual. It is only what we do not know about the nature of the various experiences involved which is interesting. What happens to a student who sees and hears Frost read his own poem as opposed to the student who sees the actor reading the poem (not "which teaches better," but "what is the nature of the differences in what is learned?"). What is the nature of the concepts communicated in the various approaches? What can we communicate by television that we cannot communicate by other means? What should be learned by picture alone, by sound alone, by picture and sound? What stimulates intellectual curiosity, empathy, motivation to understand? And how does television as the "envelope" enhance, impede, or activate the message to produce these? All such questions go beyond whether the student learns as well as by the conventional classroom method. They attempt to uncover information about what has been thought of as elusive configurations of learning. Television, certainly, did not raise all these questions but it may enable us to answer them, for recorded teaching experiences at least make it possible for us to compare and test.

When some basic understanding is at hand as to television's distinctions from and likenesses to film, books, comic strips, then another of our tasks will be easier. I refer to the establishment of some reason-

able criteria of success in presentations by television. At the present time the "successful" ETV programs are those which receive "awards" or boast larger audiences than the others. Is it not unfortunate that those who are "educating" accept as their criteria for achievement the standards which assist an advertiser in buying commercial time?

If you wish to check on the state of analysis in educational television try criticizing a program to any one of your colleagues. Most likely you will hear, "well so and so likes it," or "it was the most popular of . . .," with no attempt to meet the issue directly. Our failure to criticize is born out of a lack of criteria which we understand and can bring to bear on the issues. Perhaps an exploration into the nature of TV can help us.

The second area of research would come under the general rubric of pedagogy. I refer mainly to the television teacher. When selection is made of a teacher for a local video classroom or for Continental Classroom the best we can do is to try to find someone who is by common agreement an excellent teacher.

But what does this mean? What characterizes these so-called "good" teachers? Is a good classroom teacher automatically a success on television? What are the qualities enabling a teacher to use television effectively? What are the characteristics of a person who can meet the demanding role of a performer and teacher? While television did not create this question of "what is a good teacher?" (as it did not many of the other major ones), it may enable us to help answer it. For the first time in the history of communication we can have a record of teaching—hours of it by variously skilled teachers. These can be studied, subjectively and objectively, for definable qualities. When refined teaching skills are amplified by the uniqueness of television then we will really have scored in communication.

When we have answered some of the questions about the nature of television's pictorial-verbal communication, we may well return to more mature consideration of the external aspects. I mean when we better know television and what we can "say" with it, then we will have a better idea of what we ought to be accomplishing. External research can be rejuvenated and the answers from this aspect of research can be made more significant.

I have said that television research needs to escape the redundancy of proving it can teach and that it should move on to more basic questions. I have explained why I think that we have been pedestrian in

our present research, and I have suggested the kind of biases which I feel have affected thinking in this area. Lastly, I have suggested the kinds of research which I feel we should undertake in the next decade.

Let me say that I do not feel that by doing this, we will have solved all of our problems. In fact, I would warn you that if these things are accomplished, then will be the time to be brave. For we may discover things which will revolutionize some of our designs for learning. Some subjects may best be visualized. Others will not warrant the expense of a TV tube, for they will be the kind which can only be taught through exchange between teacher and pupil. Television explored may force us to revise our concepts of how rapidly subjects can be taught. Some subjects, we may find, can be taught more rapidly and efficiently than now, where others will require as much or even more time because of the great amount of subject matter which can be made readily available to the student. The knowledge itself which we are passing on to succeeding generations may even be of a different nature, since its ordering may have a new, pictorial-verbal emphasis rather than the purely verbal one of today.

And television's most important contribution may turn out to be not the solving of the crisis in numbers to be taught, but an attack on the crisis which is not yet so apparent. I mean the crisis of rapidly expanding knowledge. The day is past when a nation can survive and leave its books (or its educational TV programs) behind after graduation. And the day may arrive when everyone will enroll in a continuing university carried on by television, with an unprecedented teaching efficiency made possible by studies of pictorial-verbal communication.

My thesis has been general on purpose. For unless in the decade ahead we broaden our image of television to be something more than just an electronic extension of what already is, then truly we can be ashamed. For it would mean that we have not been brave enough or creative enough to ask the difficult questions, and having answered them, to take advantage of what those answers offer.

REFERENCES

1. Carpenter, Edmund. "The New Languages." *Explorations VII.* University of Toronto, Toronto, Canada, March 1957.
2. *Title VII—News and Reports.* Educational Media Branch, U. S. Office of Education, Washington, D. C., June 1959, April 1959, and February 1960. [See also *News and Reports* for July 1960 and recent listing page 222 this issue.—The Ed.]
3. *Training by Television,* SDC Report 476-02-2. Special Devices Center, Port Washington, New York (undated).

Self Instruction in Audiovisual Education: A Title VII Progress Report

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IN RECENT YEARS teacher educators have voiced a growing desire to find optimum ways of teaching the use of audiovisual materials to students who are preparing for the teaching profession. Approaches in various institutions have ranged among separate courses, integration into general or special methods courses, combinations with student teaching, and a laboratory locale as a source for training. Out of all these patterns has come much valuable experience but little objective evidence that one pattern is superior to others. This controversy, plus the opportunities for research under Title VII, led to the study now in progress at The Pennsylvania State University.

Briefly, this study concerns itself with four patterns for preparing pre-service teachers to use audiovisual materials of instruction. The four are designated as Separate Course, Integrated (with general methods), Student Teaching (taught at teaching locations), and Self-Study. It is the last named which is provoking interest among professional audiovisual people and suggesting a restructuring of method in basic audiovisual training. The brief description of the self-study approach which follows is an attempt to point up what has been developed in the study at Pennsylvania State during the fall and spring semesters of 1959-60.

Experience with students in previous audiovisual courses and remarks by teachers on this campus and elsewhere provided convincing evidence that several assumptions should be kept in mind in programming this approach: a lack of experience and of interest in things mechanical was characteristic of many students; actual fear of motor-driven devices was to be expected, particularly of motion picture projectors with their obvious moving parts; the absence of "authority" in the classroom would make it much more difficult for students so handicapped to accept the situation and to focus their attention on the learning tasks. In addition we assumed that students who had spent 13 or more years in teacher-dominated classrooms would, at best, find the self-instructional method a novelty with some distracting undertones. We also recognized the possibility that some students would regard "teacherless learning" as pulling the rug from under them just as they had passed the mid-point in their preparation for a teaching career.

These assumptions led to an approach characterized by attempts at reassurance in which we planned small steps in learning tasks and employed humor, both as "therapy" for the tense student and as a kind of sly, knowing wink at those who were not challenged by the small steps.

We undertook to reassure students in the first session by having them listen via earphones to a three-minute taped lecture which reminded them that they had learned many things without the aid of a teacher. The lecture cited examples from everyday life and pointed out to students that they had an advantage over the others in conventional sections in that they would have no instructor to study.

Something of what we hoped would be a challenge was introduced by the statement that they could expect to be better teachers as a result of having learned a body of knowledge and certain skills in this manner. The tape informed them how their questions would be considered if written and deposited in a designated place. As an added measure of reassurance we removed all mechanical equipment from the classroom (the tape recorder was placed in another room and "piped" into a junction box where earphones were connected).

Other assignments for the first hour introduced students to the flannelboard. They looked at a film describing its use (projected in a self-contained loop projector with earphones) and viewed a filmstrip (looped in a personal viewer). They experimented with flannelboards to become at ease in manipulating cloth and board figures and shapes

and to discover what portion of a figure needs to be "backed" by flocking materials and sandpaper.

At a later session where tape recorders were introduced the students listened again to a recorded lecture which described the wide range of uses for the recorder and informed them that the machines they were about to encounter were sold "over the counter" with no instructions beyond those contained in an accompanying manual. They were assured that more thorough instruction awaited them.

Another tension-reducing device employed wherever possible was that of privacy. With the thought that the possibility of appearing stupid is an active deterrent to trying, we used booth arrangements whenever practicable. We supplied earphones with both tape recorders and motion picture projectors while students were learning to operate them so that the suffering caused by "blasting" was confined to the student at the controls.

Humor was largely visual, appearing on the assignment sheets posted for each session. This took the form of a playful style of lettering and devices such as those used by Walt Kelley in *Pogo* to enliven his balloons and a bewhiskered "Herr Professor" who generally showed pleasure but could be stern, as when he reprimanded students for using "camera" as a synonym for "projector." Seasonal motifs communicated the fact that these messages were prepared especially for these students and that this was not a "canned course."

Because of lack of space, it was necessary to remove "learning setups" at the end of the period after all students had had the opportunity to experience them. For example, the combination of posters, diagrams, and other materials included in the first session of the week (scheduled for some students on Monday and for others, Tuesday) was removed Tuesday evening to make room for the second session which began Wednesday. In cases where "multiple exposure" was necessary, as with the more complicated pieces of equipment, the equipment remained in the room but the instructional materials concerning it were moved into less prominent (and sometimes less convenient) positions. It must be pointed out that the students in both semesters were scheduled into the self-study laboratory for three separate hours scattered throughout the week so that it was possible to program sequentially parts of the content within each week. Although times of entering and leaving were recorded (by an undergraduate monitor the first semester and

by the students themselves in the second semester), students were given to understand that no merit was attached to the time spent.

In addition to instruction on the operation of standard audiovisual equipment introduced in a simple to complex sequence, other course content concerned itself with audiovisual philosophy, psychology, selection and utilization. This content was presented through textbooks, reading assignments, motion pictures, filmstrips, graphics, specially prepared kinescopes and guides requiring written responses. In a few instances, comments were made for points of emphasis and correction of misconceptions. The content was programmed in such a way that skill in equipment operation was a *sine qua non* for obtaining course information. To learn from projected and recorded materials through the greater part of the course, each student had to be his own operator.

Conclusions

The conclusions we draw are based upon the first semester results of written tests on course information, nomenclature, equipment function and trouble shooting, and as a result of a timed performance test on the Viewlex 35mm projector, the Bell and Howell 16mm projector, and the Voice of Music tape recorder. They are:

1. Out of 475 students, the self-study group operated equipment with less error and with greater apparent confidence than did the students who learned equipment in a laboratory course conventionally taught.

2. The self-study group did as well as students taught by other methods on written tests on course information.

3. The self-study group tended to become more homogeneous in performance on all measures than other groups.

4. Anecdotal records showed that the self-study group accepted this approach. Some felt a real sense of discovery and accomplishment, particularly in equipment operation. Our judgment is that the latter condition was enhanced by the carefully prepared "operation" charts and other materials and by making future learning contingent upon self-operation of equipment.

5. Time records show that the self-study group spent less time than other groups in achieving approximately the same ends. We have no records as to the time each spent in reading materials outside of the laboratory locale.

6. In the first semester, on equipment performance tests totaling 62 points, the range of this group (N=36) was 42-62 as compared with 22-62 for all classes (N=275) combined with a mean of 56 as compared with 51 for the total population. Tests at the end of the second semester show an even higher level of performance for the self-study group (N=33). Total group N=c. 200)

We conclude this report of our experiences with the self-study approach for teaching audiovisual methods with certain reservations and convictions, to wit:

Given specially prepared materials, equipment and proper facilities, pre-service teachers can learn equipment operation without benefit of an instructor. This has obvious implications for organizing future audiovisual courses.

In the area of applying understandings and skills to classroom performance, we cannot make any conclusive judgments about the effects of self-study. We are certain that many potentials and problems in the areas of philosophy, psychology, selection, and utilization still need application and testing. The pending analysis of the spring semester's research and the promise of at least two more semesters of revision and experimentation lead us to hope for more definitive answers at a later date.

The Earlham College Self-Instructional Program

A report in brief by John A. Barlow

The program described in this article was organized in connection with a research project at Earlham College, supported in part by a Title VII grant, and still in progress. Mr. Barlow who is coordinator of the project presented the paper originally to the 1960 Convention of the Department of Audiovisual Instruction.

EIGHT MONTHS have passed since the official confirmation of our grant from the Office of Education and the start of the project. During this time we have begun the construction of instructional programs in several subjects namely: elementary Russian, elementary Spanish, elementary statistics, freshman English, genetics, introduction to music, Old Testament.

So far our programs have in general followed the Skinnerian pattern of brief-answer questions requiring the student to write out his answer and compare it to the program answer. By this method *all* students are led through *all* of the material. The intent is to lead the student to the right answer, never permitting wrong answers but exploring all facets and aspects of the material.

Our programs are all being written by subject-matter specialists who are currently teaching the subject programmed. Each programmer is encouraged to work through at least a portion of the Holland-Skinner Program for the natural science psychology course at Harvard. The programmers thus learn some of the background of the basic principles we are currently attempting to follow while at the same time becoming familiar with the oldest program available.

Our conception of the teaching machine is that it is a means by which some aspects of instruction by a tutor are made available to the individual student at his personal convenience. Viewed in this light the teaching machine corresponds to the tutor in the same way that the textbook corresponds to the classroom lecturer. The specific variations in design and form of the teaching machines correspond, in the case of books, to different bindings, size pages, prints, margins, use of diagrams and pictures, and so forth.

Just as the student has to be taught

how to read and to use his books most effectively, he needs to be taught how to operate the teaching machine and how to use it most effectively. The ideal machine for the scholar (as in the case of the ideal book) is inexpensive, easily available, and convenient to use. So far as the student is concerned, it appears that there is no need for the device to be made "cheat proof"; it should be designed only so that inadvertent "cheating" is unlikely or impossible.

We have found it helpful to devote one class period to an "experiment" on learning with and without knowledge of results. (Half of the class are blindfolded while they practice drawing four-inch lines for ten trials without knowledge of results; the other half draw the lines under the same conditions but with immediate information as to the length of each line drawn.) After an introductory lecture and demonstration the students seem to react quite favorably to assignments involving sequences of question-answer confirmation. If the student has some understanding of the process the "teaching machine" becomes a "self-instruction device." This seems to result in an important difference in student motivation and attitude.

An instructional program written for use in most self-instruction devices bears some resemblance to a conventional examination. The first thing that the author-programmer needs to learn (and which he must constantly keep in mind) is that it is, indeed, a type of examination. *But these tests are not designed to test students but to teach them.* Every time a student studies such a program there is a test going on—a test of the program and of the author-programmer's skill as a teacher through this medium.

There is no opportunity here to discuss all of the various principles of program construction that our students are testing for us. We are still at a stage in which we often do not know why a specific programmer or program is successful. We are only in the process of gathering some of the data that we have to analyze in order to determine which hunches and intuitions are fruitful. The most important fact is the accumulation of such data. Often one cannot successfully determine exactly why a teacher is effective. Even the long-term apprentice of a master-teacher often cannot fill his shoes. We hope that by a careful analysis of the student response to our programs we can learn to make more successful programs and even to tell other teachers how it is done.

We shall consider only two preliminary principles of programming at this time: logic and fading. In subject matters and subject-matter areas in which a logical sequence is involved or in which the material can be organized in a logical fashion (such as most scientific theories, philosophical systems, and mathematics), the skillful programmer can lead the student by small logical steps to an understanding and resulting retention of the material. Through a sequence of questions the student is gradually led to new usages, definitions, conceptions and insights. Conventional memorization and the type of repetition that is ordinarily entailed in such memorization are not involved in these procedures. The student is led to familiarize himself with new material gradually introduced in the question-answer sequences and to correctly anticipate the programmer's answers to more and more advanced questions. For the past three years John Blyth at Hamilton

College has been using this type of programming to teach logic.

This is not a new method of teaching; the basic procedure is found as far back as the Socratic dialogues. What is new is the development of a science and a technology based on a method understood only partially, if at all, by the great teachers of the past who used it. Some aspects of the art of teaching are at last becoming a part of the science of learning.

In subject-matter areas such as, for instance, foreign language vocabulary and anatomical terms, there may be no apparent logical pattern to follow. This poses a different type of problem. In such areas the principle of fading may be useful. One of the Earlham College consultants, Joseph Ebacher of Xavier University in Cincinnati, has developed a method for encouraging reading and developing the student's foreign language vocabulary which concretely exemplifies the fading principle (though his method does not involve anything that we would ordinarily call a machine).

Ebacher gives his students original and interesting material in French which they start reading in the first few weeks. As a new word or word-usage appears, its English translation is given immediately below and for the first five times that the word appears, this is repeated. By this time the student is expected to be able to understand the word correctly when it appears and the interlinear translation for this word or word-usage is not given again. The student reads the French text through a grid so that he sees only the French during his normal reading. Whenever he comes to a word he does not understand, he lowers the grid slightly to expose the English equivalent below.

A truer application of the fading principle would be a more gradual one. Instead of putting the complete English translation between the lines each time for the first five occurrences, the English equivalent would appear once or twice followed by just a portion of the English equivalent then one or two letters as a cue. In this way the English would fade out gradually as compared with the "abrupt fading" now employed.

We look forward to many possible changes in the over-all picture of collegiate instruction as our own work and that being done at other schools progresses. We expect to see the time when all students will be required to pass rigorous proficiency examinations in various basic areas before admittance to advanced courses. With the college providing self-instruction programs in basic skills, the college instructor of the future may be able to depend on every one of his students entering his class with certain prerequisite skills. The instructor can then build on this solid basis supplying the personal element and flexibility that cannot be put into a machine or self-instruction device.

If the work done with self-instruction devices is regarded as "independent study" and the student is oriented toward assuming responsibility to complete the work, a greater emphasis on other types of independent work in all areas of study may evolve. We expect our use of self-instruction through mechanical and semi-mechanical devices to be accompanied by a deliberate attempt to encourage self-instruction in other ways. And we hope eventually to be able to "fade out" the self-instruction device and the teacher, leaving our graduates as mature scholars whose self-education continues throughout their lives.

On Reactions to Mass Media Content

A report in brief by Richard F. Carter

IT HAS BEEN WIDELY ASSUMED in studying reactions to mass media content that each content category has a complementary motive in its attending audience. To know the category is to know the motive. Consequently, typologies of content have been constructed of varying rigor and from these, the motives of the audience inferred. In these studies several dimensions recur frequently, chiefly the entertainment-information and personal-impersonal dimensions. But much exists beyond these common findings that is dismissed as idiosyncratic of the investigator, the research method, or the media —or, of all three together. Our study of audience reaction to mass media therefore has exhibited at its best a *matching* of people and their wants to content and its promises.

What these approaches lack (and the author is compelled to speak from the discomfort of experience) is some measure of verisimilitude. Our previous efforts have simplified the problem until we answer lesser questions that we sought to ask. We want to know what the audience reaction to mass media content is in its entirety. What we have learned is that its reaction varies as the content, the audience itself, and the reaction context vary. It is the latter condition which is critical. We can observe audience and content, and control for their effects. But, so far, we have exercised no control on the context. We have lacked control because we understood too little of that context. This paper takes up the problem of the context of audience reaction, or as it may well be called, the *process* of audience reaction.

If we have lacked knowledge of the process of audience reaction, it is because we have neglected our theoretical resources to alleviate an operational distress. Because we experience difficulty in measuring any aspect of audience reaction we have assumed that equivalent results would follow from any slice we made through the process. Generally, we have argued that interest in and approval of content were equal or nearly equal—even though several studies show this not to be the case. To the

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extent that interest and approval are correlated responses, this argument holds. But are they correlated in the full logical sense of the term, however large the statistical coefficient? Probably not. As Barrow and Westley (1) suggest, interest undoubtedly precedes approval in actual behavior. If there is no interest, neither approval nor disapproval can result. We can speak of the interest response as a *selection* factor and the approval response as a *cathection* factor. There is, however, one more factor in the process of audience response: the *reinforcement* factor. The impact of the content on the audience, that is, the extent of the audience reaction, must consider the applicability of the content to the usual modes of audience member behavior. No matter how interesting or appealing the content, it will fall short of full impact if it does not increase the probability of some behavior on the part of the audience member.[1]

Let us look more closely at each of these three phases of the process.

As the audience member approaches a mass medium, he must choose among content alternatives. He looks to schedules and to other persons for clues. He recalls previous experiences. Will they interest him? Some won't. Some will. What he decides here determines the *maximum* effects of the cathection and reinforcement factors, for if he turns away he cuts them off. Here is where the distinctions between entertainment and information belong. This is a general selection criterion. Quite probably, this is where we should employ Schramm's (6) distinction between delayed and immediate reward content. This makes sense as a selection criterion where it would be improbable to speak of delayed and immediate cathexis or of delayed and immediate reinforcement. Here too would go the author's distinction between generalized and particularized content appeals, although his distinction seems more between poles of selectivity and non-selectivity.

After the selection of content comes the cathection phase, the concentrating of the individual's desires on the content—to use the psychoanalytic description. More simply, we can speak of the warmth of the relationship, noting MacLean's (4) dimension of nostalgic content. Jones (3), looking at the *wants* of movie characters, sees such aspects as love, affection, idealism, happiness, prestige, and power. We can speak then of an *identification* of the audience with the content symbols as the extreme form of cathection. In newspaper picture content, MacLean and Hazard (5) see emerging an idolatry toward the successful and glamorous (among women readers). In another essay (2), the author discusses this factor in terms of the degree of cathexis, ranging from the familiar and homely to the remote and impersonal.

Finally there is the reinforcement phase. Audience members tend to handle their media behaviors just as they do their day-to-day activities: they use a minimum of modal behaviors, or habits. The content which has maximum impact must impinge on these behaviors—become part of them or alter them to include it. Smythe (7), discussing the appeals of television content, distinguishes a function of orientation in the programs. This parallels

[1] The impact of reinforcement on future selections is not as complete as the previous screens are; there are fortuitous elements in selection that interfere.

the aspects of potential reinforcement—that behaviors can be altered or further habituated. The author describes a factor of security, represented in programs which deal with either ideological or physical safety in the content.

It seems that these three phases in the process of audience response subsume most of the dimensions previously offered in description of the media content, and by extension, in description of audience wants. Of the three, only reinforcement has escaped measurement as a response to mass media content. However, selection and cathection have not been properly studied as a sequential combination. And what we really need is a study of all three phases in their proper sequence. Clearly, the screening effect of selection on cathection and reinforcement and the screening effect of selection and cathection on reinforcement should be accomodated in such a study. Similarly, for the particular problem of repeated media usage, we must ascertain the screening effect of reinforcement on the probability of future selections. And so on. The circle is never ending, but it does expand and shrink, including new media content and rejecting the old, representing the selective biases of the audience and the congruence of the content to its needs.

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This next section considers how this process paradigm might be used to help understand and further develop basic television audience data. Analogous operations can be devised for assessing the total impact of other media.

It is assumed that the following three measures of the television audience are available:

1. The proportion of total viewing audience which is viewing a particular program at the beginning of the program.

2. The proportion of total program viewing time actually used by those viewing at the beginning of the program.

3. The proportion of the audience viewing a particular program at the beginning which is also viewing the same program at the beginning of its next appearance in the series. (An approximation procedure can be used for estimating this data for programs which do not appear in a series.)

These three measures correspond to the three phases of the process—the selection factor, the cathection factor, and the reinforcement factor.

Two kinds of analysis are possible: *within series* and *between series* analyses.

Within series, we can graph the weekly reports for a program in order to see its total impact and to observe the impact at each of the three phases of the process. It should become rather obvious at which of the three phases a program is losing its hold on the audience. Similarly, unusual variations in the graphs for each phase may indicate particularly good or particularly bad programs in a series—and the underlying response area. The power of these analyses becomes greater when, over a number of series of the same content type, we can compare any series to an *average* increment in audience response from week to week.

Between series, comparisons can be made of several similar content types to see their relative success in holding audiences. Comparing series on their average selection, cathection, and rein-

forcement ratings yields valuable information on the probable reasons for differential success of programs.

Beyond these very immediate services to the programming directors, two further developments can be foreseen. First, armed with data on the good and bad spots in a series, investigators can question audience members to find out the dimensions in which their evaluations are made. From this pinpoint interviewing, an inventory of judgment scales can be developed. Representing the factors of selection, cathection, and reinforcement, this inventory would prove helpful as a pilot-preview adjunct, pointing out dangerous—and promising—aspects of the planned series. Second, these data when converted to impact estimates should prove useful in the study of effective program variables and in evaluating effectiveness per unit cost in program promotion. For instance, close-ups should be evaluated against a criterion of cathection; they are only secondarily relevant to the other two phases of the process. Similarly, the structuring of the program content would best be related to reinforcement—indicating the extent to which the content could be effectively consumed by viewers. Effectiveness of advertising in bringing viewers to the program would be measured best by considering the criterion of selection, apart from cathection or reinforcement scores.

References

1. Barrow, Lionel C. Jr., and Westley, Bruce H. *Television Effects: A Summary of the Literature and Proposed General Theory*. Madison: University of Wisconsin Television Laboratory, Bulletin No. 9, May 1958.
2. Carter, Richard F. *The Perceived Appeals of Television Program Content*. Madison: University of Wisconsin Television Laboratory, Bulletin No. 8, September 1957.
3. Jones, Dorothy B. "Quantitative Analysis of Motion Picture Content." *Public Opinion Quarterly*, Fall 1942, p. 411-28.
4. MacLean, Malcolm S. Jr. *Mass Communication of Public Affairs News*. Doctor's thesis. Madison: University of Wisconsin, 1954.
5. MacLean, Malcolm S. Jr., and Hazard, William R. "Women's Interest in Pictures: The Badger Village Study." *Journalism Quarterly*, Spring 1953, p. 139-62.
6. Schramm, Wilbur. "The Nature of News." *Journalism Quarterly*, September 1949, p. 259-69.
7. Smythe, Dallas W. "Reality as Presented by Television." *Public Opinion Quarterly*, Summer 1954, p. 143-56.

Filmed Lectures as Supplementary and Refresher Education

A report in brief by Frank R. Hartman

The author, who is on the staff of the Division of Academic Research and Services at The Pennsylvania State University, wishes to acknowledge the help and cooperation of the following persons: Dean Clarence I. Noll, Dean William H. Powers, Professor John A. Sauer, Professor Robert L. Weber, and especially the graduate students of the Academic Year Institute who served as assistants in the first study. The research was sponsored by a grant from the Educational Television and Radio Center, Ann Arbor, Michigan.

A MAJOR CONCERN of American colleges and universities in recent years has been the insufficient preparation for college work on the part of many incoming freshmen. Among the several especially critical areas is introductory physics.

Numerous suggestions have been made for improving this situation: changes in curriculum; toughening entrance requirements; increases in salary; selectivity and training level of high school science teachers; and so on. But whatever the merits of improving the high school program, it is evident that several more years will be required for modifications at this level to alter the college picture. For this reason it has been necessary to ask what the colleges might do to prevent deterioration of their own standards in the interim (or in the event that no improvements are forthcoming).

One such solution is the institution of remedial programs by the colleges and universities, themselves, scheduled either preceding or concurrent with the regular academic program.

The primary concern of the studies reported here is the possibility of using filmed lectures for such remedial instruction in physics. Several advantages can be argued: (1) There is not a sufficient number of qualified instructors available to staff a remedial program with live instruction; (2) Filmed lectures of good quality are available—prepared by an instructor of national reputation and possessing a high degree of technical proficiency; (3) Homogeneity of instruction among sections is in-

sured; (4) The cost per student instructed is relatively low.

What remains to be demonstrated is the remedial effectiveness of a filmed physics lecture program.

A scrutiny of the physical science program at Pennsylvania State revealed that two investigations pertinent to the value of filmed remedial lectures in physics could be made without greatly disturbing the program itself. The first involved a compulsory orientation course for all freshmen in the College of Chemistry and Physics which permitted the showing of selected film lectures to these students for one hour a week. Since none of the freshmen involved were scheduled for physics until the following semester, this arrangement made it possible to evaluate the capacity of filmed lectures to increase the level of achievement in the areas covered prior to the introductory course. This constitutes the first experiment to be described.

A second possibility was to schedule evening showings of the filmed lectures concurrent with a physics course and make student attendance and expressed opinion the criteria. This is the concern of the second study reported.

The filmed lectures were selected from a complete one-year course, "Introductory Physics," taught by Harvey E. White and produced by Encyclopaedia Britannica Films, Inc. The filming was accomplished simultaneously with the telecasting of the lectures over WQED-TV in Pittsburgh.* The process is described in detail by Professor White in a 1957 article in *Physics Today* (2). An evaluation of the films for instruction of rural high school students has now been completed in Wisconsin. Two progress reports are available on this project (3, 4). An urban high school evaluation was performed in Chicago (1). Teaching outlines and test items have been prepared by Encyclopaedia Britannica Films to accompany the films.

The First Experiment

Procedure: Approximately 180 students, the entire freshman class in the College of Chemistry and Physics, were randomly divided into two groups ultimately reduced by academic shrinkage to 80 and 75 respectively. After measurement on a pretest consisting of the College Entrance Examination Board Test in Physics, each group was placed in a separate lecture room. One group received films selected from the series covering electricity and magnetism. The other viewed films from the series devoted to mechanics. Each group viewed a single film at the same hour. A short quiz followed the film, administered by graduate students in physical science education who assisted at the class meetings. (This assistance was limited to a simple introduction of the film, quiz administration, and answering questions on the quiz problems when time permitted). The quizzes were graded by the students themselves and were designed to stimulate learning, not as criteria for the experiment.

The arrangement described above permitted each group to serve as a control for the other, assuming that, as subject matter, electricity and magnetism is relatively independent of mechanics. Thus, two individual experiments were carried out; one on the effect of mechanics films on achievement in mechanics; the other on the effect of elec-

* See page 220 for another experiment involving the Harvey White physics films.

tricity and magnetism films on achievement in electricity and magnetism.

At the close of the 11-week experimental period during which one film and quiz was given each week, an hour examination was administered to both groups. The examination consisted of two parts, one concerning mechanics, the other electricity and magnetism. Each part contained 25 questions selected from the ones compiled especially for the films by Encyclopaedia Britannica Films. The selection was made by the assisting graduate students. Each test was timed for 25 minutes and the order was randomized in such a way that approximately half of the students in each experimental group took the mechanics test first and the electricity and magnetism test last; the other half reversed the order.

A questionnaire concerning the value of the films to the students was administered at the last film showing.

Results: The results of the two covariance analyses of the scores on (1) mechanics and (2) electricity and magnetism using the College Entrance Examination Board test as an adjusting variable are presented below.

The results of analysis of achievement scores indicate that significant differences in achievement resulted in both groups from viewing the series of films.

The results of four relevant questions from a questionnaire administered at the end of the experiment are given on the facing page.

TABLE 1 — ANALYSIS OF COVARIANCE OF THE MECHANICS SCORES USING THE COLLEGE ENTRANCE EXAMINATION BOARD SCORES AS AN ADJUSTING VARIABLE.

Source	*SS*	*df*	*V*	*F*	*p*
Treatment	72.78	1	72.78	9.59	$< .01$
Error	1153.70	152	7.59		
Total	1226.48	153			

Group	*Adjusted Means*	*n*
Mechanics Viewing Group	15.70	75
Control Group	14.33	80

TABLE 2 — ANALYSIS OF COVARIANCE ON THE ELECTRICITY AND MAGNETISM SCORES USING THE COLLEGE ENTRANCE EXAMINATION BOARD SCORES AS AN ADJUSTING VARIABLE.

Source	*SS*	*df*	*V*	*F*	*p*
Treatment	77.05	1	77.05	7.75	$< .01$
Error	1510.98	152	9.94		
Total	1588.03	153			

Group	*Adjusted Means*	*n*
Electricity and Magnetism Viewing Group	13.26	80
Control Group	11.85	75

1. What effect do you think the films have had on your understanding of physics?

	E & M Percent	*Mechanics Percent*	*Total Percent*
Very helpful	15%	14%	14%
Somewhat helpful	67%	58%	62%
Not very helpful	16%	26%	21%
Not at all helpful	2%	2%	3%
Total	100%	100%	100%

2. Do you feel the need for some sort of supplementary work beyond your high school preparation in physics such as a no-credit physics preparatory course?

	E & M Percent	*Mechanics Percent*	*Total Percent*
Yes	43%	39%	41%
Maybe	28%	34%	31%
No	29%	27%	28%
Total	100%	100%	100%

3. How much high school preparation in physics have you had?

	E & M Percent	*Mechanics Percent*	*Total Percent*
One-half year	0%	1%	1%
One year	90%	85%	87%
Two years	3%	1%	2%
Three years	0%	1%	1%
None	4%	10%	7%
Hardly any	3%	1%	1%
No answer	0%	1%	1%
Total	100%	100%	100%

4. Would you like to see a preparatory physics course introduced at Pennsylvania State which would be based on these films?

	E & M Percent	*Mechanics Percent*	*Total Percent*
Yes	68%	64%	66%
No	20%	25%	22%
Possibly	11%	4%	7%
No answer	0%	3%	1%
Don't know	1%	1%	1%
Use other material also	0%	1%	1%
Course voluntary	0%	1%	1%
Take laboratory trips	0%	1%	1%
Total	100%	100%	100%

The Second Experiment

Procedure: An evening showing of two of the series of lecture films on mechanics was scheduled once a week. The time was selected to conflict with relatively few courses and extra-curricular activities. Two filmed lectures on mechanics were shown each evening in proper sequence without any supplementary material, either written or verbal.

The nature of the films and the time of showing was announced to approximately 300 students who were encouraged to take advantage of the opportunity to improve their knowledge of mechanics. Approximately 240 of these students were enrolled in the non-engineering course in mechanics (this course does not require the calculus). The remaining 60 were freshmen in chemical engineering who received information concerning the films in a meeting with the head of their department.

Attendance records were kept and at the close of the showings questionnaires were sent to all who had attended.

Results: The major criterion for the success of the trial was obtaining a large and continuing audience for the films. The initial showing attracted 34 students, a little better than 10 percent of the students to whom the films were announced. The attendance was reduced to 15 for the second week. At the fifth presentation only three students attended, and the venture was canceled.

Thirty-four of the students who viewed varying amounts of the series were contacted. By means of a follow-up letter a completed questionnaire was obtained from 30 of the 34. Those who viewed the films seemed positively disposed toward them. Results of three pertinent questions from the questionnaire administered at the close of the trial are given below:

1. What effect do you think the films have had on your understanding of physics?

Very helpful	30%
Somewhat helpful	40%
Not very helpful	30%
Not at all helpful	0%
	100%

2. Do you feel the need for some sort of supplementary work beyond your high school preparation in physics such as a no-credit physics preparatory course?

Yes	38%
No	28%
Maybe	34%
	100%

3. Would you like to see a preparatory physics course introduced at Pennsylvania State which would be based on these films?

Yes	86%
No	14%
	100%

Discussion

The findings of these rather modest studies indicate that filmed lectures are useful in increasing the knowledge of physics of college freshmen. Significant gains were recorded in both of the areas of subject matter sampled. These gains may be considered impressive in that they were achieved with a small number of lectures (11) without outside preparation or practice on the part of the students and with none of the usual academic incentives such as grades, credits, or honors. The student acceptance of the films is general, with a large majority supporting a film-based preparatory course.

In regard to the optional attendance of concurrent films it appears that presentation of the lecture material on a voluntary attendance basis as supplemental to the freshman program is impractical. The students simply cannot find time for this extra activity, and to make it compulsory would constitute a serious imposition.

The studies reported may be considered as tentative evidence that an economical and productive remedial physics program can be based on filmed lectures. The practical and economic advantages of such a program have been previously mentioned. Experimental comparisons with other media of instruction within a formally constituted course are necessary, however, before any strong endorsement of the film-lecture method is possible. The advisability of a given college or university undertaking any remedial instruction of its freshmen remains, of course, a policy decision for that institution.

References

1. Engelhart, N. D.; Schwachtgen, E. C.; and Nee, Mary M. *The Chicago Public Schools Television Instruction Experiment in High School Physics.* (Mimeographed report, undated).
2. White, Harvey E. "Physics Course on TV." *Physics Today.* 10: 14-19, September 1957.
3. *Wisconsin Physics Film Evaluation Project, Progress Report.* Madison: University of Wisconsin, May 8, 1958.
4. *Wisconsin Physics Film Evaluation Project, Progress Report II.* Madison: University of Wisconsin, November 1958.

Teaching High School Physics Through the Use of Films

A report in brief by Donald T. Scott

THE PURPOSE of the experiment described here was to investigate and analyze the opinions of a random sample of students and teachers toward the use of the Harvey White physics films. These television films (T-films) were produced in connection with a live television course offered by Professor White of the University of California at Berkeley over Station WQED in Pittsburgh during 1956-57.

The experiment involved 30 teachers and their students in 30 experimental schools and students studying physics by traditional methods in 30 control schools. In addition to opinions held by students and teachers, the experimenter was also concerned with the interest in science as expressed by students from both control and experimental schools.

The study was a corollary to the Wisconsin Physics Film Evaluation Project designed to determine the effectiveness of using 81 of the 162 thirty-minute 16mm Harvey White T-films in teaching high school physics for one semester.

A total of 30 teachers and 534 students from the experimental schools and 764 students from the control schools participated in the study. The data were collected by means of a series of free-response and "check type" questionnaires and inventories given periodically during the course of the experiment. The data were tabulated and treated statistically by testing for significant differences through the use of analysis of variance factorial design. Correlations showing relationships between variables were calculated when appropriate. Percentages, permitting comparisons of different sized groups, were determined when necessary. Data representing expressed opinions that could not be reported numerically were presented as direct quotations from the teachers and students.

Ten problems were proposed and considered in the tabulation and analysis of the data. A summary of the findings

The author is curriculum coordinator in the Neenah (Wisconsin) public schools.

and conclusions taken from these analyses follows:

1. Teachers and students felt that the T-films offered excellent laboratory demonstrations, some of which could be used to replace traditional laboratory work.

2. Insufficient time was one of the major problems frequently mentioned by teachers and students. They felt that the T-films should be shortened or some of them eliminated.

3. Teachers felt that the T-films had the greatest contribution to make in schools where the teacher is not prepared to teach physics and/or where laboratory facilities are limited.

4. The majority of students did not like studying physics from the T-films as well as they did by traditional methods.

5. The majority of teachers and students felt that these films presented too much new material at too rapid a pace.

6. The T-films did not provide for enough variety and flexibility in the high school physics course.

7. The films did not seem to help students develop or maintain interest in science when compared to traditional methods of teaching high school physics.

8. Students' study habits changed significantly when the T-films were used. They reported less textbook and out-of-class studying and writing-up of assignments but more note-taking and "paying attention" in class.

9. Teachers reported that they learned many helpful teaching procedures from these films.

10. Many teachers disapproved of giving up most of their class time to "another teacher." This feeling strengthened as the semester progressed.

11. Teachers and students felt that the T-films kept them on the topic of physics at a continuous pace.

12. The teachers expressed many opinions, varying from strong "pro" to strong "con." About two-thirds of them expressed generally negative opinions toward using T-films as compared to one-third who expressed generally positive opinions. In most cases the opinions expressed by the teachers were shared by the students.

Recommendations:

To the film producer:

1. Reduce length of such films; there is nothing sacred about 30 minutes.

2. Include fewer films in a series produced to cover two semesters of high school study.

3. Consult high school physics teachers in planning future film series for high school use.

To teacher training institutions:

1. Instruct future teachers in effective procedures for using films such as the T-films.

To school administrators and classroom teachers:

1. Consider the use of the laboratory films to replace some of the traditional teacher demonstrations.

2. Allot more time to physics in order to permit coverage of material presented in the T-films. (This recommendation is based on the assumption that the amount of material offered in the T-films is not too much.)

NEW GRANTS ANNOUNCED

THIRTY-TWO NEW GRANTS to colleges, universities and specialized nonprofit organizations totaling slightly less than one million dollars were announced by the U.S. Office of Education in July to bring the total number of active Title VII grants up to 115. Fourteen of them, each under $3000, were funded under the small grants program initiated last January. (The purpose of this progam is to foster media research by qualified persons who may yet have only limited experience in this field of research. It also provides funds for small-scale or exploratory studies, including predoctoral research.)

A short description of the 32 projects funded and names of their directors follow:

1. Comparison of short-term effects of some television programs, $2291; 10 months; Leslie W. Sargent, Pacific Union College, Angwin, Calif.

2. Measurement and analysis of physiological response to film, $36,536; 1 year; Harry W. Case and Edward Levonian, University of California, Los Angeles. (Dr. Levonian is a former contributor to this journal. See page 62 of the 1960 Winter issue.)

3. Study to determine to what extent students seeking to master bodily skills can be helped by watching themselves on film, $355; 9 months; Hope M. Smith and Marguerite A. Clifton, University of California, Los Angeles.

4. Comparative study of effectiveness of filmstrip, sound filmstrip, and filmograph for teaching facts and concepts, $2875; 10 months; Ronald James McBeath, audiovisual department, University of Southern California, Los Angeles.

5. Role of sponsored motion pictures in the high school, $1323; 1 year; DeLoss B. Williams, graduate assistant, audiovisual department, University of Southern California.

6. Influence of a teaching machine program on foreign language learning, $8947; 1 year; James John Asher, San Jose State College.

7. Comparative study of communication methods between students and teachers when instruction is given by television, $9237; 10 months; Dale E. Wolgamuth, American University (Washington, D. C.).

8. Television education in elementary school speech improvement, $21,600; 2 years; Morton J. Gordon, University of Hawaii.

9. Development and application of a new method to test relative effectiveness of specific visual production techniques, $10,753; 1 year; Martin T. Cobin and Charles J. McIntyre, University of Illinois.

10. Experimental teaching and instructor training through television and videotape, $140,716; 3 years; Robert W. Janes and Charles J. McIntyre, University of Illinois.

11. Effectiveness of sound motion pictures in motivating high school students in mathematics, $2500; 1 year; Robert K. Tiemens, graduate assistant, State University of Iowa.

12. Experimental evaluation of tape-recorded lectures in college classroom, $1820; 3 months; W. James Popham, Kansas State College at Pittsburg.

13. Effectiveness of televised guidance instruction in the elementary grades, $2875; 1 year; Olga M. Lemke, Portland School Department (Maine).

14. A follow-up study on effects of televised elementary science instruction, $17,578; 14 months; Ralph Garry, Boston University.

15. Investigation of concept development in grade school science taught by television, $80,787; 17 months; Ralph Garry, Boston University.

16. A study of magnetic tapes for improving patterns of speech of migrants to urban areas, $30,138; 2 years; Ruth I. Golden, Detroit public schools.

17. Effects of and response to film versions of short stories among junior high school students, $1840; 10 months; Elias Levinson, doctoral candidate, New York University.

18. Effect on instruction in high school physics and chemistry of various combinations of televised instruction, correspondence lesson material, and personal visitations by student teachers, $13,528; 1 year; Elvin Hibbs and John W. Dunn, Oklahoma City Board of Education.

19. Assessment of some newly designed educational media for self-teaching of young children in school and at home, $72,459; 1 year; Lester F. Beck, Portland State College (Oregon).

20. Study of various methods used by pupils to master spelling without the help of a teacher, $2240; 1 year; Wendell I. Smith, Bucknell University, Lewisburg, Pa.

21. Programmed teaching materials in mathematics for superior students in rural high schools, $57,778; 2 years; Wendell I. Smith and William Moore, Bucknell University.

22. Study of determinants of audience formation and reaction to college credit courses taught by open-circuit television, $85,000; 2 years; Charles F. Hoban, University of Pennsylvania.

23. Adjusting teaching machine programs to differences in the learning needs and capabilities of individual students, $64,768; 20 months; Leslie J. Briggs, American Institute for Research, Pittsburgh.

24. Principles of programming basic college courses for presentation over closed-circuit television, $159,000; 2 years; C. R. Carpenter, Pennsylvania State University.

25. Principles of programming material for teaching machines and their relation to transfer of training, $2841; 1 year; Gerald R. Levin, Brown University. Providence, R. I.

26. Development of a scale to measure attitudes regarding the use of new educational media, $4934; 1 year; Curtis P. Ramsey, George Peabody College for Teachers, Nashville, Tenn.

27. Automated instruction of remedial English, $49,644; 2 years; C. Dwight Dorough and John L. Michael, University of Houston (Texas).

28. Study of teacher attitudes toward subject content and methods of presenting content as a basis for evaluation of educational films, $2700; 27 months; Henry R. McCarty, Jr., West Texas Cooperative Audiovisual Services, Lubbock.

29. Televised distribution of visual aids by low-power UHF, $49,956; 30 months; Keith M. Engar, Station KUED, University of Utah, Salt Lake City.

30. Investigation of principles involved in adapting linguistic materials for use with automatic instructional media, $2800; 1 year; Cynthia Dee Buchanan, Hollins College (Virginia).

31. Investigation of the use of automated instructional devices in teaching elementary Latin, $2700; 1 year; Judith Anne Bailey, administrative assistant, Hollins College.

32. Application of audiovisual and automatic devices to the teaching of French, $2640; 1 year; Elaine L. Burroughs, graduate assistant, Hollins College.

INTERNATIONAL COOPERATION IN MASS COMMUNICATION RESEARCH

Raymond B. Nixon

This article describes the aims and activities of the new UNESCO-sponsored International Association for Mass Communication Research, of which the author became president January 1. Dr. Nixon is professor of journalism at the University of Minnesota and editor of JOURNALISM QUARTERLY, *published by the Association for Education in Journalism. Since March 1957 he has visited 45 countries to study their research facilities in the field of mass communication.*

UNESCO'S CONTINUING EFFORTS to further intellectual and scientific cooperation across national boundaries have led to the establishment of an organization which is of potential importance to everyone in the field of mass communication. This is the International Association for Mass Communication Research, which attained provisional status in late 1957, adopted permanent statutes at its first general assembly in October 1959, and began full-scale operations this year from headquarters in Paris.

When the Association brought out its first printed Bulletin (in both English and French editions) in December 1959, some 240 individuals and organizations in 30 countries had already applied for membership. Considering that the organization previously had done little to publicize its existence, this initial response seems to indicate that IAMCR is looked upon by many as filling a genuine need.

Indeed, IAMCR is the direct outgrowth of the second of two major recommendations made by an international conference of mass communication leaders held under UNESCO auspices in Paris in April 1956. The first of these recommendations urged the creation of several regional centers to aid in the training of professional personnel for the media in those countries which do not now have adequate training facilities. One such center (to serve Europe, Africa, and the Middle East) was opened in the fall of 1957 at the University of Strasbourg, France. Another (to serve all Latin America) began last fall at the Central University of Quito,

Ecuador. And a far more comprehensive program for Asia, envisaging not simply a training center or centers but a wide range of measures to aid in developing the press, film and broadcast media, got under way this year at a conference held January 18-30 in Bangkok, Thailand. Wilbur Schramm of Stanford University headed the U. S. delegation.

The recommendation for an international association of mass communication research specialists resulted from the conviction of communication leaders in many countries that such a far-reaching program as UNESCO's should be based upon the soundest knowledge that modern scientific research can make available. As the director of UNESCO's Department of Mass Communication said, in paraphrasing the words of an American scholar: "We have been playing by ear long enough; now we need to know what the score says."

Purposes

IAMCR came into being at an organizational meeting in Paris in December 1957 and was attended by a number of U. S. representatives. One of these was Howard Kresge, chief of the Orientation and Counseling Branch, ICA,* who represented the Department of Audio-Visual Instruction of the National Education Association. The purposes of the Association, as defined at the initial gathering and in subsequent actions of the Executive Committee, include the following:

1. To facilitate exchange of methods and findings between research institutions and to promote personal contacts and cooperation among individual members.

2. To promote the setting-up and development of research centers in mass communication in countries where such centers do not now exist.

3. To seek recognition in all countries for mass communication as a subject for independent scientific investigation.

4. To set up an international agency for documentation and research for the benefit of members.

5. To disseminate information on important experiments and results in the field of mass communication teaching and research.

6. To sponsor cross-national studies likely to contribute to deeper knowledge of the nature, techniques, and effects of mass communication.

7. To contribute, if required, by means of appropriate research, to the training of journalists and others working in the mass media.

The Paris meeting also elected provisional officers, headed by Professor Fernand Terrou, director of the French Press Institute, and Jacques Kayser, his deputy director, as president and deputy president, respectively. At the general assembly held in Milan, Italy, last October, the statutes were amended to provide for a secretary-general and a deputy secretary-general. The first slate of officers under the permanent statutes then was elected, as follows:

President, Raymond B. Nixon, professor of journalism, University of Minnesota, U.S.A.; secretary-general, Fernand Terrou, and deputy secretary-general, Jacques Kayser, University of Paris. Vice presidents: Jacques Bourquin, lecturer in the University of

* International Cooperation Administration

Lausanne, Switzerland; Mieczyslaw Kafel, professor in the University of Warsaw, Poland. Additional members of the Executive Bureau: Claude Bellanger, secretary-general of the International Federation of Newspaper Editors and Publishers, and editor of *Parisien Libéré*, Paris; Marcel Stijns, president of the International Federation of Journalists and editor of *Het Laatste Nieuws*, Brussels, Belgium; Francesco Fattorello, director of the Institute of Mass Communications, University of Rome, Italy; and Martin Loeffler, representing the newly formed Society for Mass Communication Studies in West Germany. Members of the still larger Executive Committee include all the foregoing and also Roger Clausse, Belgium; Domenico de Gregorio, Italy; Danton Jobim, Brazil; Adbus Salam Khurshid, Pakistan; Vladimir Klimes, Czechoslovakia; Nell Morrisson, Canada; O. W. Riegel, United States; R. J. E. Silvey and E. B. Simpson, United Kingdom; Jean Tardieu, France.

Some of the officers are elected for two-year terms; the president for four years. However, the presidency may not be held for two successive terms by the same person or the same country.

Provisions for Audiovisual Media

As the list of officers indicates, journalists and journalism teachers have been among the leaders in forming the Association. UNESCO has made it clear from the beginning, however, that it wishes the organization to devote equal attention to all the mass media—to film, radio, and television as well as to the press. Indeed, one of the first requests referred to the IAMCR by the UNESCO secretariat was for a survey of research findings regarding the influence of the various media on children. This is a communication problem in which several other UNESCO-related organizations have expressed persistent interest. It is also one on which a many-faceted approach is especially desirable.

To facilitate full participation by all the major groups interested in mass communication research, the general assembly at Milan authorized the organization of four sections within the Association: historical research, legal and political research, psychological and sociological research, and economic and technical research. It was pointed out that each of these sections cuts across media lines—that is, they are concerned with the audiovisual as well as the print media. However, provision was made for the organization of a fifth section devoted specifically to the audiovisual media—if the interest from members in this field should justify it. In any event, two members will be added to the Executive Committee from this general area. The cinema is already represented by Domenico de Gregorio of Italy, and radio-television by R. J. E. Silvey of the United Kingdom.

The Historical Section, headed by Professor Giuliano Gaeta of the University of Trieste, has had one meeting and is planning a second to be held in conjunction with the 11th International Congress of the Historical Sciences in Stockholm, Sweden, August 17-18, 1960. Participation of press historians from Austria, Belgium, Czechoslovakia, France, Germany, Italy, Poland, and the United States in this meeting is already assured.

While the other sections have conducted no formal meetings, Wilbur Schramm of Stanford University has

accepted the chairmanship of the Psychological and Sociological Section, Secretary-General Terrou heads the Legal and Political Section, and Marcel Stijns of Belgium, the Economic and Technical Section.

Annual dues are $12 for individuals, and $24 and up for organizations. Membership applications may be sent to the Association at 27 rue St. Guillaume, Paris VII.

Initial Projects

Although IAMCR was organized on a provisional basis for its first two years, it already has some impressive accomplishments to its credit. First, it undertook for UNESCO the updating of that organization's first international survey of recent mass communication research,[1] a project which now has been completed for the years 1956-57. Then, in October 1958 it sponsored at the Strasbourg Center an international symposium on "Professional Secrecy in Journalism." The papers from this symposium are being extended to cover a larger number of countries, and publication of a book-size report in collaboration with the International Press Institute is contemplated.

At the first general assembly last October, IAMCR sponsored a second international symposium in conjunction with the International Federation of Newspaper Editors and Publishers (FIEJ) and the International Congress of Printing, Publishing and Paper, both of which were meeting in Milan at the time. The International Film and Television Council also participated. The general subject of this symposium was "The Compared Effects and Reciprocal Influence of the Major Means of Communication."

A long-range project which has been under way for some time is the preparation of a cross-cultural dictionary of technical terms used in mass communication research, so that researchers using different languages may be able to communicate better with each other. The Institute of Press Science at the University of Warsaw has been a leader in this work.

In this same connection, the IAMCR *Bulletin* itself should be extremely useful, for it lists in both English and French the current research projects of IAMCR members and gives them an opportunity to call upon their colleagues in other countries for cooperation.

Future Possibilities

The growth of facilities and personnel for mass communication research in many countries, especially in the period since World War II, has opened up new possibilities for comparative studies in this field. As Paul Lazarsfeld of Columbia University has said of communication systems: "The important questions usually are elicited by comparing any one system with another." Not infrequently such comparisons elicit some of the answers as well. In fact, the spectacular growth of the social sciences in the 19th century came about principally through tremendous increase in the number and variety of comparative studies.[2]

It is for this reason, as well as for

[1] UNESCO. *Current Mass Communication Research*. Paris: Mass Communication Clearing House, UNESCO, 1957.

[2] UNESCO, "Comparative Cross National Research." Special Issue of *International Social Science Bulletin*, Vol. VII, No. 4, 1955.

the general purpose of "encouraging co-operation among the nations in all branches of intellectual activity," that UNESCO has supported the work of international non-governmental organizations in many fields of endeavor. In fields where such organizations already existed but were inadequately supported, it has granted them financial aid; in other fields where there was no international organization but a recognized need, UNESCO has taken the initiative in setting up the organization or in promoting and facilitating its establishment. The latter was the situation in the field of mass communication research where IAMCR came into being as an independent agency but with a subvention from UNESCO to assist it through the difficult early years.

While it is true that the bulk of mass communication research is being done in relatively few countries, it is also true that significant beginnings have been made in more than 30 of the 45 countries which the writer has had the good fortune to visit over the last three years.[3] Anyone who has talked with workers in this field—on every continent and on both sides of the so-called Iron Curtain —cannot but be impressed by their eagerness for closer contacts with their counterparts in other countries.

Stimulus to Member Countries

Much more training of communication researchers and standardizing of techniques must be accomplished, of course, before there can be international cooperation on a wide scale. But UNESCO's experience in other fields has been that the very existence of an international organization helps not only to stimulate cooperation but also to increase the training and facilities within each country which in turn make cooperation more meaningful.

Beyond the development of mass communication research itself lies the larger goal of the more effective and enlightened use of the mass media in the long struggle for international understanding and peace. As Tor Gjesdal, director of UNESCO's Department of Mass Communication, has remarked, "the good that can come from the cooperation of scientists and mass communicators in such a cause can hardly be over-estimated."

[3] For further information on this point, see two articles by the author on his trips abroad: "Journalism Research Around the World." *Journalism Quarterly*, 35: 3-14, 144-46, Winter 1958; "Factors Related to Freedom in National Press Systems." *Ibid.*, 37: 13-28, Winter 1960.

A PROPOSAL FOR INTERNATIONAL AUDIOVISUAL EXCHANGE

Edgar Dale

Dr. Dale is professor of education at Ohio State University. This article is based on his remarks to the annual convention of the Department of Audiovisual Instruction, NEA, last March. See page 224 for another discussion of international exchange.

IN THE AUDIOVISUAL FIELD we are concerned with the projection of images. What kind of image of America are we now projecting abroad on a one-way communication through our films, through news about juvenile delinquency, payola, and the rest? Are we creating a world image of people who put pleasure ahead of discipline, entertainment ahead of education?

As we think about the "two-way exchange" in the field of audiovisual materials what is it basically that we are trying to do? What is the over-all set of values which we espouse at home and internationally?

First of all, those of us who have lived fulfilled lives wish to help people everywhere live fulfilled lives. John Dewey put it this way: "What the best and wisest parent wants for his own child, that must the community want for all its children." I know that we have not reached this goal in the United States yet, but I believe that we are one of the world's best examples of a nation concerned with the fulfillment of children and youth.

Second, we believe that the material and spiritual fruits of the world should be shared as equals. We put respect ahead of rice, dignity ahead of dollars. We believe in charity not in the corrupted sense of "give-away" but in the age-old sense of the word *caritas* which means dearness, affection, high regard. We know that the "gift without the giver is bare." And we wish to share in a mood of mutuality.

Mutuality, or sharing, is illustrated in a definition of communication by John Dewey. He says that "communication is a process of sharing experience till it becomes a common possession. It modifies the disposition of both parties who partake in it."

To communicate, therefore, means that we are willing to modify our position and our disposition. Much conversation may not be communication at all, but merely a set of interrupted monologues, a kind of verbal ping-pong.

Third, we do not want to impose our own government on anyone or indeed Americanize them. But our mood is one of great respect and pride for our governmental system. I do not suggest that we neatly package and export our political institutions yet I believe that they are worthy of continuing study for the light they can throw on the difficult governmental problems arising not only in the new nations of the world, but also in older ones, including our own. We Americans tend to forget our own remarkable history of self-government.

Fourth, we would like to base our exchange of ideas, techniques, and material goods on the premise that we want the people of the world to be different, to discriminate between alternatives, and then to choose what they want. We do not want a homogenized world culture that is 99.99 percent pure. However, we do believe in the importance of a commitment to and involvement with those values deemed by critical thinking to be best.

Now I should like to move to a practical statement of where this discussion leads. I should like to suggest specifically steps that might be taken to bring about this exchange of ideas and techniques. These suggestions are based on some of the types of projects discussed by the Committee on International Relations of the Department of Audiovisual Instruction. They are: the exchange of audiovisual information; exchange of audiovisual materials; training of audiovisual personnel; and a project on world-wide literacy. I would like to elaborate on them in that order.

The exchange of audiovisual information: Let us call this the *clearing-house function.* We must think hard about that information on audiovisual education which can be exchanged through written or spoken letters and through printed materials — books, pamphlets, magazines, and articles. In each small country and in many places in the larger countries there should be a clearing-house center of books, pamphlets, and articles on audiovisual communication. Certainly, too, we would expect to find the best American materials in our ICA and USIS* libraries abroad. A clearing house, however, would have material from all countries. UNESCO in Paris is one such center. Some of our state universities try to keep such files.

A file, however, is not enough. There must be a lively, interested person who is concerned with getting the material distributed—not just a clearing house, but also a clearing man or woman. Oversea Visual Aids Center, 31 Tavistock Square, London, under the direction of G. H. Rusbridger, has such a clearing house for the Commonwealth. There is also a clearing house on community education under the direction of T. R. Batten of the University of London. International Christian University in Tokyo performs an international clearing-house function. Perhaps the time has come for the U. S. Office of Education or the Department of Audiovisual Instruction to take a more active role in this clearing-house field.

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* International Cooperation Administration and the United States Information Services.

The exchange of audiovisual materials: A better system must be instituted to make the actual materials of instruction internationally available. Information about available U. S. films is found in the series of catalogs put out by the Department of State under the direction of Wilbert H. Pearson. These are titled: *United States Educational, Scientific, and Cultural Motion Pictures and Filmstrips 1952 Edition, 1954 Supplement, Science Section 1956, and Education Section 1958.* These catalogs are revised periodically and I can attest from firsthand experience that they are used abroad. Mr. Pearson has been assisted by an Interdepartmental Committee on Visual and Auditory Materials for Distribution Abroad, all of whose members are in government work in Washington, D. C. There is also a national advisory board of 18 persons including the writer.

I believe it would be both feasible and profitable to arrange traveling sets of films on such topics as "Modern Teaching Practices in American Schools," "Communication in Modern Industry," "The Geography of the United States," "World Climate," "Schools Around the World," "Materials Handling," and "Forest Conservation." We might include in the packet the 10 or 20 best films in these fields. Some would be international packets, some national. This would be a simple way for a group of businessmen, teachers, or government specialists to look at the best world films in their field.

The training of audiovisual personnel: We can take pride in what we in the United States have already done to develop audiovisual personnel or communication specialists. Foreign students have been sent here by their governments to ready themselves for this kind of work. The special training given for health and other kinds of campaigns at Indiana University under L. C. Larson is an excellent example. We have also trained audiovisual personnel for work abroad. I am thinking of the work of Don Williams at Syracuse University, Robert Wagner with the USIS, and others. ICA and USIS have done a great deal in this field, the former through the work of Gerald F. Winfield, chief of the Mass Communications Media Staff.

UNESCO also does a top-notch job in seeing that able persons from abroad receive training in the United States. Perhaps our next step in this country might be to put some of our training techniques into a more manageable form for use abroad. Could we have kits of materials on: How to Develop a State-Wide Health Campaign, How to Make and Use Filmstrips, Developing Audiovisual Materials for Literacy Education, and so on?

As I have implied, others are more qualified than I to comment on training audiovisual personnel for work abroad. I would like to suggest however that basic training involves getting into the other fellow's shoes, not only seeing his own customs as he sees and feels them but seeing our customs from his point of view. This is a tough assignment. I believe Margaret Mead expressed it pretty well when she wrote:

"If an agricultural specialist or specialist in literacy techniques believes that the way he uses a knife and fork, a toothbrush, soap and towel, holds a pen, sits on a chair, or wears clothes is intrinsically more 'natural,' 'righter,' or 'truer' than the way in which other peoples manage these things, then no amount of conscious good will and tol-

erance will make the technical help that is offered really palatable to the receiver." [1]

A project on world-wide literacy: We shall miss the boat if we don't explore adequately the role of audiovisual materials in developing world-wide literacy. Consider these facts:

About half of the adults in the world are illiterate.

Out of 350 million children in the world between the ages of five and fourteen, 100 million, or slightly less than one third, are not in school. And in some countries illiteracy is actually increasing because the introduction of new health measures has sharply reduced the deaths of little children. The big increase in child population has put an intolerable burden on the already overcrowded and understaffed schools. Furthermore, the limited schooling in most of the Asian, African, and South American countries means that children have only limited reading skills when they leave school. And because community reading materials are lacking at their limited level, this meager literacy lapses and they no longer read.

I strongly recommend that in the framework of a world-wide literacy program we make a vigorous, experimental attack on the possibility of using film, filmstrip, and radio in either teaching reading or in supplementing reading instruction. The value of these instruments in teaching adults to read is not known; it has not been adequately researched. We do know, however, that these electronic devices are enormously valuable in conveying ideas which, when combined with reading, make a powerful communication tool.

The techniques for teaching reading both to children and adults are quite well known in nearly every country in the world. The literacy specialists have been at work. What is needed is more money, more concern, more dedication.

But don't forget that the mean annual income is $1400 in developed countries and $120 in undeveloped countries—a ratio of about 12 to one. Do the countries of Western Europe, the United States and Japan want the rest of the world to be literate, or do they prefer instead the temporary comforts of life? I say temporary because, unless there is greater sharing of the material, intellectual, and spiritual resources of the world, there are many uncomfortable years ahead of us.

Would these projects cost money? Of course they would. How would they be paid for? Basically they would be paid for out of increased productivity. The important question is: Would it be a good national and international investment? Certainly it would be a productive investment in international security. There would be increased mutuality along a two-way street, heightened awareness of the kinds of contributions that can be made by all nations in the world, and an increase in international understanding and sympathy.

However, some of the projects suggested here would be paid for through normal channels of world trade. Nor is a large sum of money involved in some of the most important ones. I would hope the clearing-house function would not be a tremendous library job, but rather that modest funds would be provided by a government or by private

[1] Mead, Margaret. "Cultural Factors in Community-Education Programs." *Community Education.* Fifty-eighth Yearbook, Part I, National Society for the Study of Education, 1959. Chapter 3, p. 94.

groups in employing a bright, alert person who was wise about helpful materials for exchange. The clearing-house man would be scanning the audiovisual horizon and discovering what worthwhile, big ideas ought to be exchanged. He is not trying to provide archives for all kinds of international audiovisual material, but rather is playing the role of the reference librarian well equipped with bibliographical tools and key reference materials.

In conclusion: Nearly everybody is equipped with 20-20 hindsight. We can now see pretty clearly what we should have done five, 10, 15, or 20 years ago. But 20-20 foresight is rare.

We have no Delphic Oracle to consult, no divining rods to use, no neat formulas which will enable us to do what needs to be done. We shall have to think, plan, and do. This is painful, but it is also challenging and invigorating. Edmund Burke once said that "for the triumph of evil, it is only necessary that good men do nothing."

We are running out of decades of decision. Trigger-happy or panic-stricken leaders may touch off the world's last explosion.

It is not easy to know what to do, but the wisest and best solution will always be closely related to two aspects of human behavior: first, a sensitivity to the needs of people; second, a critical analysis of how to meet these needs. We must, in short, be tender-hearted and tough-minded.

A NEW COMMUNICATION ON COMMUNICATION

James Q. Knowlton

A review of *The Process of Communication*, by David K. Berlo (New York: Holt, Rinehart and Winston, 1960, 318 p.)

DAVID BERLO has added another to a growing collection of scholarly, up-to-date books on aspects of the communication process—books that have little in common except that they all deal with communication. This last observation is no surprise to anyone who believes it when he tells himself that "communication is the basic social process." But of course communication today is more than this. The field of communication includes such things as the information theorists' mathematical theory of communication where there is no concern with either people or "meaning." Animal communication studies and concern even with pigeon-flying, pony express, civil liberties and selenium cells, (to say nothing of the more commonly adopted orientations of political scientists, sociologists, linguists, etc.) together provide a strange lot of bed fellows.

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The reader will be glad to learn that Berlo is concerned with both people and meaning—as topics that he discusses in his book, and also as considerations that he must have kept continually in his mind as he wrote. Communications people, like football coaches, aren't required to practice what they preach, but if they can—and Berlo can—it surely helps.

Berlo developed his book and revised it through use with ICA* Seminars on Communications, and this may account for what appears at times to be an almost too highly self-conscious concern to write simply. Much good material developed for use in these Seminars, but heretofore not widely circulated, is now made generally available.

Many of us in audiovisual education await a text on communication that, among other things, comes to grips in a reasonably respectable manner with some of the sticky problems in nonverbal communication. Berlo doesn't set himself this task, consequently it is not relevant to criticize his book for such a "deficiency." He does comment on

* International Cooperation Administration

the importance of nonverbal codes, and he does this in his opening paragraphs.

Although he did not set himself to the task of scrutinizing the nonverbal message, Berlo did produce a book that in most other ways is valuable for the audiovisualist communicator. The extremely difficult task of screening, and the even more difficult task of logically synthesizing and interpreting interpretations and observations so screened from the pervasive field of communication, has been well begun by Berlo; and his book should go a long way toward filling the needs of the student of audiovisual who desires some grounding in theories and in the practice of communication.

The approach differs not only from that of the information theorists in having brought people into the act, but also from all media-centered approaches. (Though of course Berlo doesn't ignore media.) We in the audiovisual field have sometimes been guilty of this—of ignoring what the media mediate between—and a chief gain of the "new" communications orientation for our field has, it seems clear, been that of again centering our attention on people. Berlo does this well in his chapter on "The Fidelity of Communication" where he considers such "determinants of effect" as *attitudes*. If a "communications orientation" can't teach us that communicatees are *interpreters* of messages, that their attitudes and beliefs cause them to selectively expose themselves to messages, selectively interpret, and selectively remember their interpretations of messages, we haven't learned even to stand, let alone take a first step in this field. Berlo doesn't let us down; he makes all this quite clear in one way or another.

Berlo's book has 11 chapters. Each chapter concludes with a section entitled "Suggestions for Thought and Discussion." Surely this is pedagogically sound. He also suggests sources for further reading.

Following the first chapter, which is in typical form for an introductory statement, he presents an unusually valuable second chapter where he deals with the concept of model and of process. He also presents a useful (quite standard) model of the communication process. Most important to one first approaching the study of communication is an understanding of this concept of a process, and Berlo develops this notion simply and forcefully. The notion of process—that there are ongoing *events* in dynamic interrelationships and not *things* or "fixed sequences of events"—is a notion that is as crucial as it is compelling, once understood. Although a simple idea, students often have trouble with the concept of process. Perhaps this is due to the subject/predicate way of thinking built into us by the grammar of our language as Benjamin Whorf, Bertrand Russell, and others suggested. Even when the concept of process is grasped, our habitual ways of categorizing the world make certain implications of the concept most difficult to accept. In particular, many students experience as disconcerting the idea that "the basis for the concept of process is the belief that the structure of physical reality cannot be *discovered* by man; it must be *created* by man." (p. 25)

Failure to understand communicative behavior as process has in the past led to faulty thinking of a sort Berlo refers to as "click-click," "push-pull," or "hypodermic needle" views of communicative acts. This is the mistaken belief

that all that is required for communication to occur is to encode a message in a language understood by the communicatee, and expose him to this message. We well know now, as noted above, that the selective nature of perception makes clearly false this "hypodermic needle" view.

Berlo's approach, relative to that of other authors writing on communication, is more self-consciously in the learning and education stream. In Chapter 4, where he speaks in learning terms, he points up the similarity between communication and learning. He does this rather well, not stopping with the obvious point that the teacher (this implying a learner) is a professional communicator. Rather, he discusses a learning process model and a communication process model, and then translates each into the terms of the other, and the reader has an "ah-ha" experience. The reader clearly perceives the high degree of isomorphism between these two models. It would have been well here, if Berlo had delved into the concept of model even further, to help the reader understand the functions of models, and the criteria for choosing model *x* today and model *y* tomorrow.

In the fifth chapter, on "interaction," Berlo discusses and compares the " inference" and the "role-taking" theories of empathy. This discussion is quite good, and the decision that "empathy" works both by inference and by role-taking processes is a popular decision. He depends on Solomon Ash to support the inference theory, and George H. Mead to support the role-taking theory. There is a very great body of more recent literature on this interesting subject that Berlo (probably intentionally) overlooked. Perhaps this is just as well if his intent was to present a brief and greatly over-simplified treatment as seems to be the case in connection with this topic.

Berlo doesn't forget about culture (social systems)—something that is possible only to symbol using, hence "time-binding" animals (Korzybski's phrase). However, I would have liked to see him develop the Sapir-Whorf hypothesis more than he did in the chapter on "The Fidelity of Communication" and bring it forth in Chapter 6 on social systems (and culture); and to say more about cross-culture communication in this connection. The Sapir-Whorf hypothesis, which states that the grammatical categories of one's language powerfully and unconsciously influence the way one perceives his world, is a useful idea even if it turns out to be partly or even mostly incorrect. At least this is true for a person, like the audiovisualist, who has special interest in analogic codes. Very briefly, the point here is this: analogically coded messages may be presumed to have generally larger interpreter families than is true with digitally coded messages. Analogic messages may, then, have even more importance for cross-cultural communication than had been thought previous to the popularization of the Sapir-Whorf hypothesis. There are some ideas here that deserve much more exploitation than they have so far received.

In Chapter 7 Berlo bravely tackles the question of *meaning*. He grapples as well with the problem of "the origin of language." He admits that the latter problem is insoluble because no one was around to record the epoch-making event. Nevertheless he trots out the often trotted-out "Ding-Dong," "Bow-

Wow," "Yum-Yum," and other theories of language origin because he insists that this will help with the problem of meaning. I don't believe he makes this particular point very convincing; but in dealing with the meaning problem he does make good use of Osgood's "mediation hypothesis."

"Dimensions of Meaning" is the title of Chapter 8. Making believe, for the moment, that meanings can be thought of independently of central nervous systems, Berlo distinguishes between denotative, connotative, and other meaning dimensions. Relative to the latter, Berlo tells his reader about the work of Osgood, Suci, and Tannenbaum with the semantic differential (a multi-dimensional technique for objectively assessing connotative meaning and derived by means of factor analysis procedures). And in the last chapter he gives some examples of semantic differential scales.

Chapter 9 on perception and Chapter 10 on inference problems deal with topics of importance to communication. This is especially true of the perception chapter as earlier points, made in this review, suggest. In Chapter 11, Berlo has performed a service for the audio-visual profession in writing a useful and much needed chapter on definition. In this year's DAVI Invitational Seminar,* there were many expressions of need for a more adequate definition of our field, or (and this turns out to be quite similar) a need for a more adequate conceptual rationale. A careful reading of Berlo's final chapter on definition, with the mental set to clarify one's thinking about the audiovisual field will, I believe, yield big dividends to whoever makes this investment of his time.

Berlo's book is easily read. With 100,000 or so words and illustrations in the number of a baker's dozen, he communicates much about communication. The book is written at an introductory level. It is not above a bright college freshman, but would bore few for whom most of the ideas are not new. The audiovisual graduate student who has had little preparation in the behavioral sciences will find this text a special blessing.

* The author refers to the first of an anticipated series of seminars treating the professional education of the audiovisualist which was conducted last March in Cincinnati during the annual convention of the Department of Audiovisual Instruction, NEA.

■ TELEVISION

Cincinnati Public Schools

Report of Three Experiments in the Use of Television in Instruction, 1958-59. Cincinnati Public Schools. 71 p.

Purpose: To study the effectiveness of television instruction for pupils of varying levels of ability; to determine whether teaching is improved by television; and to determine the relationship of pupil and teacher attitudes toward the effectiveness of television instruction.

Procedure: Four biology classes were compared to discover the effect of television instruction on pupils of varying ability.* A full year of seventh-grade mathematics was telecast to determine whether inservice growth would occur and result in greater pupil achievement. A sixth-grade science course was used to study the effect of pupil and teacher attitudes. Appropriate tests and evaluation techniques were employed.

Results: One biology test showed television instruction to be significantly more effective than conventional instruction and was uniform for all ability groups. A Facts About Science Test, used to evaluate the biology course, showed no significant differences between types of instruction and levels of ability; however, below average ability pupils preferred televised biology instruction while those above average preferred conventional instruction. In the mathematics study, pupil achievement did not reflect any value resulting from the inservice experiences of the teachers; high ability pupils did better with conventional instruction while those with average ability did better watching television. In science, conventional instruction appeared better for the average and below average pupils.—*L. Twyford.*

Holmes, Presley D., Jr.

Television Research in the Teaching-Learning Process. Doctor's thesis. Detroit, Michigan: Wayne State University, 1959. 152 p.

Purpose: To analyze trends of results in television research relating to the teaching-learning process.

Procedure: Research information was organized and coded from which a classification system was developed. This system made it possible to organize the information so that it would be readily and meaningfully available, to identify what is now known, and to determine what is not known thus permitting suggestions for future research.

Results: Almost 90 percent of comparisons between television and conventional instruction showed no substantial differences in achievement or information gain.

* The biology experiment is treated in greater detail on page 176.

Television favors the teaching of sciences while conventional instruction does better for English, speech, and communications. Lectures produce greater information gain than do discussions in which students do not actively participate. Television students at home do as well or better than students in conventional classrooms. Highly visualized presentations result in less learning—possibly because the visual material distracts from assimilation of verbal matter. There is significantly greater gain in critical thinking under conventional conditions than under television, particularly for highly intelligent students. Achievement records of students participating in television experiments show improvements over students in previous semesters before television experiments were introduced. There are no indications that attendance falls off in television classrooms, nor does it cause a greater drop-out rate. However, students with a knowledge of television content may evidence low attention.

Research on student attitudes indicates that students prefer conventional instruction; in television they prefer talk-back facilities even though few use them. They prefer television in classrooms to television in a lecture hall and favor highly visualized presentations. They indicate that the instructor and the size of the class are more important than provision of lecture notes. There is evidence that the instructor is important in shaping students' opinions and their learning. Attitudes of students toward television can more accurately be described as attitudes toward other elements involved in the teaching-learning process—the instructor, the situation, and the content.—*L. Twyford.*

Lam, Kenneth F., and Shields, O. L.

Annual Report of Jefferson County and Kentuckiana Educational Television Projects, 1958-59. Louisville: The Jefferson County Board of Education and the Kentuckiana Educational Television Council. 26 p.

Purpose: As part of The National Program in the Use of Television in the Public Schools, this project was organized to investigate the feasibility of teaching large classes; to study its budgetary implications; to see how a television project affects the school building program; and to learn to develop teacher talent.

Procedure: Closed-circuit and broadcast programs were continued for the second year and the use of television was expanded. The Stoddard plan of organization was employed. Large classes ranged from 90 to 432: there were 2527 students in the general science program; 2142 in English; and 2472 in American history. The elementary program involved 2224 pupils who were taught Spanish, science, and social studies. Achievement was measured for the courses.

Results: Savings in excess of operating costs amounted to $600,741 for secondary instruction and $297,646 for elementary instruction. Achievement was greater for television classes in some cases and for conventional classes in others.—*L. Twyford.*

Myers, Lawrence, Jr., and Gardner, Eric F.

"An Inexpensive Method to Determine the Efficiency of a Television Program." *Journal of Applied Psychology* 44: 39-43, February 1960.

Purpose: To describe and demonstrate a quick and economical technique of sequential analysis to estimate the efficiency of a television program. Efficiency is defined as the cost in dollars to reach 1000 households.

Procedure: Acceptable and unacceptable efficiency limits are set by the advertiser. He also sets the level of risks of making incorrect decisions on the basis of the sample evidence. From this information it is possible to set up a series of figures

associated with each interview. When the number of viewers obtained cumulatively exceeds the established values one can say that the efficiency level has been attained and no further telephone interviews are required.

Results: This method of determining the efficiency of a television program reduces the number of interviews required to a minimum and permits advertisers to check smaller markets and to check more often.—*L. Twyford.*

The University of Nebraska

The Nebraska Experimental Program in the Use of Television and Correspondence Study, 1957-58. Lincoln: The University of Nebraska. 58 p.

Purpose: To discover whether students taught by television-correspondence study in small high schools learn as well as students of comparable ability taught by regular classroom methods in other high schools.

Procedure: Seven subjects were taught entirely by television and correspondence study to 691 students. These were compared with several thousand students in large and small high schools taught by conventional instruction.

Results: Achievement in algebra was essentially the same for the television-group and for control groups in large and small high schools. No differences were found in the teaching of literature or general mathematics. On one of the two final physics tests the large high school control group was superior to but not significantly better than the other. The large high school control group was significantly more favorable for teaching geometry and the mechanics of English. In Spanish both control groups exceeded the television-correspondence group.—*L. Twyford.*

■ TRAINING AIDS

Newton, John M.

Training Effectiveness as a Function of Simulator Complexity. Human Engineering Technical Report NAVTRADEVCEN 458-1. U. S. Naval Training Devices Center, Port Washington, New York. Research by the General Dynamics Corporation. September 1959. 93 p.

Purpose: To compare the effectiveness of training devices having various degrees of simulation.

Procedure: Trainees were taught on five submarine trainers and then tested on the Universal Submarine Simulator. The most complex simulator was used for testing. Performance was measured in terms of time on ordered course and correct depth.

Results: Generally no significant differences were found among the scores obtained under the five conditions although there were great differences in their complexities; scores tended to increase with simulator complexity. It was recommended that where cost is a factor one should consider a simplified trainer which may give effective training at greatly reduced cost.—*L. Twyford.*

ANNOUNCING A COMPETITION

for exceptional plans
in the field of

TELEVISION RESEARCH

SPONSORED BY A GOVERNING COMMITTEE—MARK A. MAY, CHAIRMAN; LEON ARONS, SECRETARY; C. RAY CARPENTER, JOHN B. CARROLL, JOSEPH KLAPPER, PAUL F. LAZARSFELD, WILBUR SCHRAMM, MILTON SHERMAN, SAMUEL A. STOUFFER

Designed to contribute to the advancement of scientific knowledge in the field of mass communication.

PURPOSE: This Competition was devised to produce exceptional plans for television research, either for television itself, or in relation to other means of communication. It is our hope that this Competition will excite the imagination and inspire the participaton of unusually competent persons in univerities, business, industry, government service and all basic fields of of activity.

NATURE & SCOPE: The main concern is with television and human behavior. "Behavior" is used broadly to include knowledge, attitude, motivation, perception, attention, skills, as well as any other aspect of human behavior, whether psychological or social. Plans may pertain to either basic or applied problems, and may involve experimental studies, surveys, correlational studies, methodological developments, conceptual models and communication theory, or any combinations of these. Exploratory studies are acceptable.

JUDGING: Each plan will be judged on the basis of the *importance* of the problem selected, its *freshness*, originality, and *"breakthrough"* potential; the *soundness* of the plan, including the extent to which it takes important variables into account; the *generalizability* of results or concepts; the plan's *feasibility;* and its *completeness* and *clarity* of presentation. Plans will be evaluated by a panel of distinguished specialists drawn from appropriate disciplines.

ELIGIBILITY: The Competition is open to everyone, except members of the governing committee and their immediate families.

AWARDS: Eighteen plans will be selected for publication in a special book, and the authors of each will receive an honorarium of $250. The authors of the two outstanding plans will be awarded further with $4,000 and $1,500 respectively.

* * * *

Entries will be received until March 15, 1961. Write for more particulars on specifications, rules, etc. Secretary, Governing Committee, TV Competition, 1 Rockefeller Plaza, New York 20, N. Y.

The Competition is being underwritten by the Television Bureau of Advertising, Inc., a non-profit organization supported by the television industry.